



# Imperial Bureau of Plant Breeding and Genetics

## Plant Breeding Abstracts

Vol. XVI, No. 1

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School of Agriculture  
Cambridge  
England

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*Note.*—Initialled abstracts are written by the following:

Mr S. N. Collings . . . . .	S. N. C.
Dr S. Ellerton . . . . .	S. E.
Dr H. Fox . . . . .	H. F.
Mr J. L. Fyfe . . . . .	J. L. F.
Mrs R. M. Ingham . . . . .	R. M. I.
Dr T. C. Yin . . . . .	T. C. Y.
Mr I. Zacopanay . . . . .	I. Z.

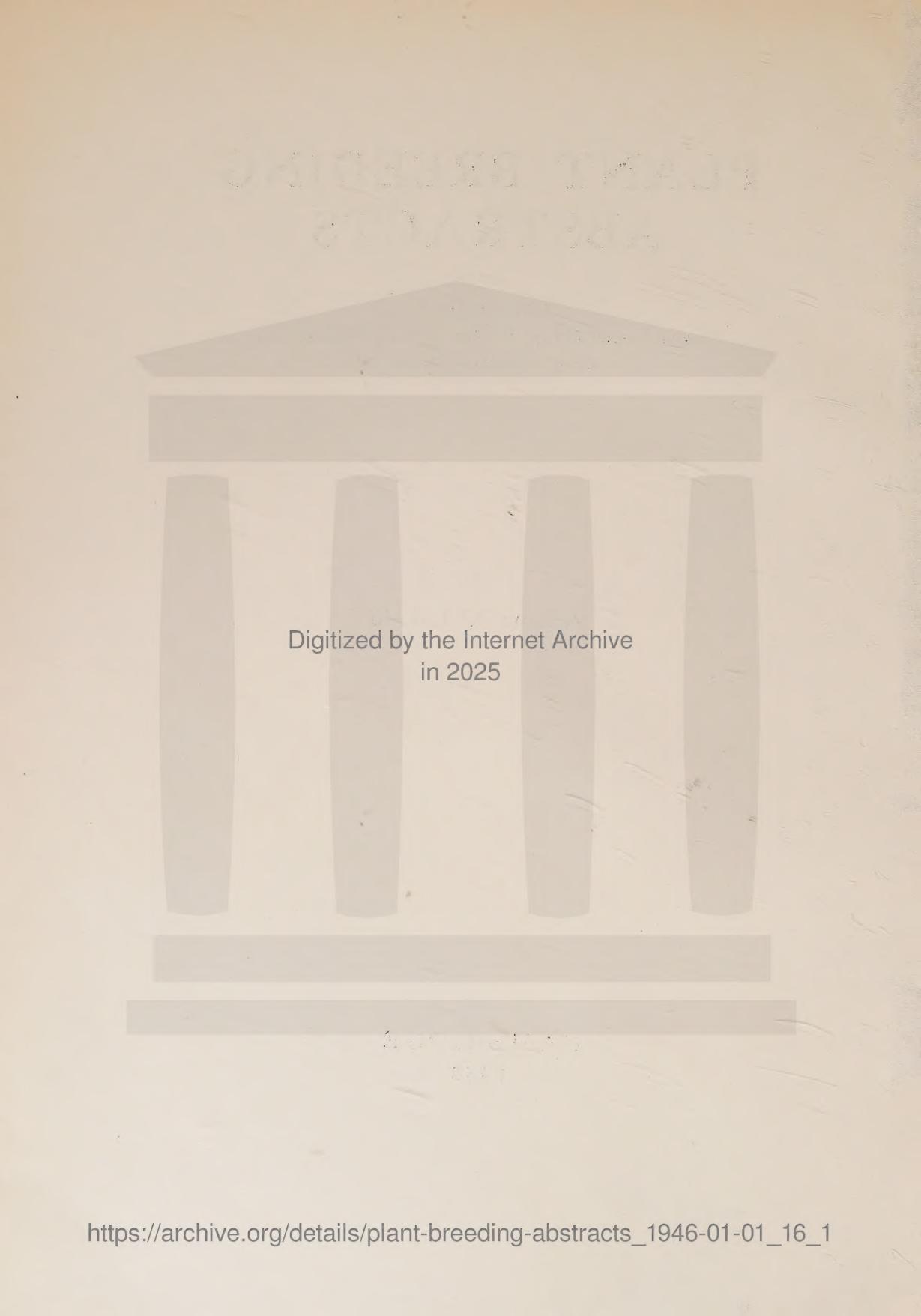
\* General studies, see also individual crops.

# PLANT BREEDING ABSTRACTS

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# Plant Breeding Abstracts

Vol. XVI, No. 1

## Part I. Empire Section

### \*STATISTICS 519

1. DYSON, E. J. 519.24  
**A note on kurtosis.**

J.R. Statist. Soc. 1943 : 106 : 360-61.

The author finds a mathematical condition, in the case of distributions with zero means and equal variances, that the fourth moment of one is greater than the fourth moment of the other. If the distributions are  $f_1(x), f_2(x)$ , a sufficient condition that  $\mu_{14} \geq \mu_{24}$  is that there exist numbers  $a_1, a_2, a_3, a_4$  in increasing order of magnitude such that

$$\text{for } -\infty < x < a_1 \quad \left. \begin{array}{l} a_2 < x < a_3 \\ a_4 < x < +\infty \end{array} \right\} f_1(x) \geq f_2(x),$$
$$\text{and for } a_1 < x < a_2 \quad \left. \begin{array}{l} a_3 < x < a_4 \end{array} \right\} f_1(x) \leq f_2(x).$$

The condition is not necessary, even for unimodal distributions having a single inflexion on either side of the mode. S. N. C.

2. KRISHNA IYER, P. V. 519.24  
**The distribution of the mean of samples from a rectangular population.**  
Curr. Sci. 1945 : 14 : 18-19.

The problem, already solved by Irwin using characteristic functions, is solved here using two lemmas on  $n$ -fold integrals. The required distribution is not given explicitly; instead, separate functions give the distribution over the range of values 0 to  $1/n$ ,  $1/n$  to  $2/n$ , etc., where  $n$  is the sample size. S. N. C.

3. KRISHNA RAO, C. R. 519.24  
**Familial correlations or the multivariate generalisations of the intra-class correlation.**  
Curr. Sci. 1945 : 14 : 66-67.

If sets of readings are taken over different characteristics, and over different families, there will be times when it is desired to know if there is any broad difference between families over all characteristics. The stock method adopted by Fisher was to maximize certain linear functions of the readings; here, the effect of maximizing a different function is discussed. S. N. C.

4. KRISHNASWAMI AYYANGAR, A. A. 519.24  
**Interaction formulae in analysis of variance.**  
Curr. Sci. 1945 : 14 : p. 35.

With repeated application of the relation  $\Sigma x^2 - n\bar{x}^2 = \Sigma (x - \bar{x})^2$ , the author arrives at the algebraic expressions and identities for the sums of squares and interactions in a three factor analysis of variance. He claims that this elementary approach is fundamentally more satisfying than the earlier methods. S. N. C.

5. PEARCE, S. C. 519.24  
**Sampling methods for the measurement of fruit crops.**  
J.R. Statist. Soc. 1944 : 107 : 117-26.

The article is largely descriptive of the problems arising from the estimation of fruit crops and fruit size, but one aspect of the statistical work is of more general interest.

\*General studies, see also individual crops.

The situation may be described in the following terms. Given that fruit is packed randomly into a set of containers, each tree in general filling a different number of containers, what is the best method of sampling from the containers so as to estimate the total yield for each tree, and what will be the variance of such an estimate? The type of method considered is to estimate the total yield of a tree from a knowledge of the number of containers filled by the tree, and the weights of a selection of all containers. The variance of this estimate will depend on the variance of container weights between and within trees, which variances are estimated simultaneously in a preliminary experiment. A second problem considered is that of estimating the mean size of the fruit; here, it is the question of the method of selecting the sample which is the more difficult.

S. N. C.

6. SAWKINS, D. T.

519.24

**Simple regression and correlation.**

J. Roy. Soc. N.S.W. 1944 : 77 : 85-95.

The author is concerned with the estimates of regression constants, giving a commentary on the usual techniques rather than presenting any new procedure. Thus, in the case of the regression  $y = \alpha + \beta x$ , we have  $\Sigma y = \alpha \Sigma 1 + \beta \Sigma x$ ,  $\Sigma xy = \alpha \Sigma x + \beta \Sigma x^2$ ,  $\Sigma x^2 y = \alpha \Sigma x^2 + \beta \Sigma x^3$ , etc. Regarding the  $\alpha$ ,  $\beta$  as unknowns in simultaneous equations, we may estimate their value by solving any two of the above equations. In practice, we always solve from the first two, because the estimates so found have minimum sampling variance. This was to be expected because minimum sampling variance is a characteristic property of least square estimates.

For third and higher order regressions, orthogonal polynomials are introduced but without much enthusiasm, due to the increasing complexity of the expressions.

In regressions of unknown orders, there are two cases: (1) when there is more than one  $y$  for each of a number of  $x$ 's and (2) when not so. Case (1) is comparatively simple, for we may test the residual variance about the regression curve against the pooled within replicate variance. If the residual variance is too large, a higher order regression is needed. Case (2) requires the usual comparison of sizes of sums of squares about two regression curves.

When  $x$  and  $y$  are both normal variates, the author finds a joint trivariate distribution, which, in the particular case of zero population correlation, yields the result that

$$\sqrt{\frac{r}{\left\{ \frac{1-r^2}{n-2} \right\}}}$$

is distributed as "t" with  $n-2$  degrees of freedom, where  $r$  is the estimate of the correlation coefficient from a sample of size  $n$ .

S. N. C.

7. KEMPTHORNE, O.

519.271.3

**Comments on the note "On a theorem concerning sampling".**

J.R. Statist. Soc. 1944 : 107 : p. 58.

In a paper on sampling theory Simpson tested the value of a function which depended on certain arbitrary constants; to provide a safety margin in the case of departure from normality, he made these constants depend on the data of the experiment. It is here emphasized that such safeguards are quite unnecessary where there is no departure, and an experiment is quoted to show the effect of such procedure. If there are 50 observations spread over 6 groups, a 5% significance of difference between groups will occur 50% of the times.

S. N. C.

**\*BREEDING 575**

8. DAHLBERG, G.

575:581.02:519.24

**Nature, nurture and probability.**

Nature, Lond. 1945 : 156 : p. 539.

It is suggested that the theory that the characters of organisms can be adequately explained by the interaction of genetic and environmental factors should be modified so that the element of chance is also included. Tumour formation and psychological traits are believed to result from such processes and probability methods are thought to be necessary in their investigation.

\* General studies, see also individual crops.

**Scottish Society for Research in Plant-Breeding. Report by the Directors and Report by the Director of Research to the Annual General Meeting 19th July, 1945 : Pp. 34.**

**Oats**

Among the hybrids that have shown promise, particularly as regards resistance to lodging, are selections from the following crosses: Progress x Elder, Elder crossed with Early Miller, Semi-Dwarf and Marvellous, Early Miller crossed with Progress and Semi-Dwarf, [(Victory x Black Mesdag) x Victory] x Elder, and [(Castleton Potato x Beselers Prolific) x (Victory x Black Mesdag)] x Marvellous. Some of the promising early maturing hybrids have been derived from the following crosses: Marvellous x Orion, Orion x Yielder, Castleton Potato x Yielder, Elder x Mulga, Victory x Bathurst, Potato x Wilga, and (Victory x Black Mesdag) x Yielder. Selections of the cross between *Quality* (*Avena sativa*) and *A. byzantina* are under observation with the object of producing a more satisfactory oat than the bristle-pointed oats (*A. strigosa*) for the alkaline soils on the west coast of Scotland.

Named varieties and hybrids have been compared on the basis of the proportion of kernel to husk.

**Swede**

The work of breeding for resistance to finger-and-toe disease is receiving increased attention. The strain ABJ, which has the turnip as an ancestor, is considered to be a possible economic variety.

A small-scale trial was held to test the winter hardiness of six strains, which consisted of the hybrid strains ADC, AFR, and AFS, line CHi, selected from Champion, MGc, selected from Magnificent, and another new line MFg.

**Potato**

Breeding work has as its objective the development of new varieties combining, as far as possible, a high degree of resistance to blight, field immunity from viruses A, X and Y, resistance to leaf-roll, and the various desirable commercial and culinary qualities.

Different and more virulent strains of blight appeared. Blight resistant plants were classified into the following groups on the basis of their reaction to three different strains, designated A, B and C: (1) immune to strains A and B but susceptible to strain C; (2) immune to strains A and C but susceptible to B; and (3) immune to strains A, B and C. In group (3) promising selections were obtained from the triple hybrid (*S. Rybinii* x *S. demissum*) x *S. tuberosum*.

Most of the wild and native cultivated forms of the Mexican and South American potatoes at Craigs House have received preliminary examination for their reaction to each of the six common potato viruses by graft inoculation. Certain types have proved hypersensitive, and therefore field immune, to one or more of the viruses X, A, B and C. In addition, a clone of *Solanum simplicifolium*, two clones of *S. Salamanii* and two clones of *S. demissum* have exhibited hypersensitivity to virus Y, and may also be field immune. Hybridization experiments are in progress to make use of the virus resistant qualities of the South and Central American species. Genetical investigations of the mode of inheritance of field immunity to viruses and leaf-roll resistance were continued.

In co-operation with commercial breeding activities a number of advanced generation seedlings of potential economic or breeding importance were examined for their reaction to individual viruses, and with a view to extending the range of suitable parental material. Many of the seedlings were blight resistant and also field immune to viruses X and A; an attempt is being made to add leaf-roll resistance to this combination.

Among the group of seedlings derived from crosses between cultivated varieties only, there is a seedling from the cross Craigs Defiance x Gladstone, which has given high yields of attractive tubers, comparing favourably with standard varieties, and which is field immune to viruses A and X.

**Kale**

A cross between thousand-headed kale and broccoli was outstanding as a heavy-yielding, leafy type.

**Beans**

In a trial at Auchincruive Experimental Farm, Ayrshire, two early ripening varieties of field beans, derived from single plant selections of a Russian variety, matured 9-18 days earlier than the other varieties in the test. Mass-selection has not, however, been effective in producing a sufficiently high degree of purity; an attempt is being made to obtain the desired purity by selfing under bags.

10. PAL, B. P. and  
RAMANUJAM, S. 575:633(54)  
**Plant breeding and genetics at the Imperial Agricultural Research  
Institute, New Delhi.**  
Indian J. Genet. Pl. Breed. 1944: 4: 43-53.

Agricultural problems in India are discussed, and under the headings of interspecific hybridization, polyploidy, mutations, genetics of self-sterility, hybrid vigour, and vernalization, recent work is reviewed.

11. MACKIE, J. R. 575:633(66.9)  
**Annual report of the Agricultural Department, Nigeria 1942 (1943) :**  
Pp. 17. (Mimeographed.)

#### Cotton

Selection was continued in both the Northern and Southern Provinces. In the Southern Provinces the attempt to produce a cotton of the Ishan type but with a rougher lint was unsuccessful. In the Northern Provinces seed of a high yielding mixture of strains is available.

#### Cassava

A programme of intervarietal hybridization has been initiated.

#### Cocoa

Breeding work was continued on a reduced scale. Trials were laid down to compare introductions from Trinidad with the most promising Nigerian selections.

#### Kola

Considerable variation in yield between individual trees has been observed among selections.

#### Oil palm

Improved seed is available from parent trees which are the result of selection for yield and fruit composition for two generations.

12. HILL, A. G. 575:633(67.6)  
**The improvement of native food crops. A précis of the more im-  
portant work done in East Africa during 1944.**  
E. Afr. Agric. Res. Inst., Arusha 1945 : No. DF/5/2 : Pp. 15.

In addition to routine variety trials, the following items of interest are reported:—

#### Wheat

In Tanganyika, Sabarero and 117A have shown greater resistance to yellow rust than 192, Rongai and L3.

#### Maize

In south Nyeri, Kenya, selections of Muratha were made for streak resistance. Selections of the early variety Kagolo and other native stocks were obtained in Nyasaland. In the Eastern Province of Tanganyika, bulk selection from the yellow flint introductions, Ekstem and Durum, was continued.

#### Millet

High yielding strains of *Eleusine* have been selected in Northern Rhodesia. In trials of *Pennisetum* in Nyasaland, *P. tamale* and *P. leonis* gave the highest yields. The conclusion has, however been reached that slow-growing millets give considerably smaller yields than sorghum and are therefore of little value for food consumption. Their chief advantage at present is their apparent immunity to stem-borer attack.

#### Sorghum

Selection of Dembera was continued in Nyasaland. In Uganda, T.27 has exhibited resistance to *Sphacelotheca Sorghi*, L.33 susceptibility.

#### Rice

In Kenya, single plant selections have been made from seed introductions; the varieties Mbuyu, Ambarekore and Sindano have so far shown the most promise in yield and disease resistance. Selections of local rice maintained their promise in Tanganyika.

#### Potato

Observations have been made at Tanganyika on the reaction to blight of 20 varieties. The only variety showing marked resistance is the local Kinongo from Kenya.

**Cassava**

In Amani several clones have been produced by intervarietal hybridization which exhibit high resistance to the local viruses; these are to be distributed for trial in other areas in East Africa. The  $F_3$  back-cross generation has been reached in the following interspecific hybrids: cassava x "tree" cassava, cassava x Ceara rubber and cassava x *Manihot dichotoma*; a fair proportion of these hybrid seedlings possess high resistance to one or both of the local viruses, seedlings of the last-named cross giving promise of immunity; several more back-cross generations may, however, be necessary to produce a satisfactory edible tuber.

The results of tests of varietal reaction to mosaic in Kenya, Nyasaland, Northern Rhodesia and Uganda, are reported.

**Soya bean**

The differential response of varieties to spacing was investigated in Uganda.

13.

575:633(68.9)

**Report of the Department of Agriculture, Nyasaland Protectorate, for the year 1944. Pt II. Experimental work.** 1945 : Pp. 12.

**Cotton**

Selections from Mz.561 are to be further tested. One of these, T-3, shows higher resistance to jassid than the other selections. Spinning tests have indicated that derivatives of Mz.561 produce a better type of lint than Crown Land U.4.

**Tea**

Final selection previous to clone trials will be made among 32 selections showing satisfactory yield and drought resistance.

**Tung**

An attempt to obtain improved planting material of *Aleurites montana* includes the selection of promising mother trees, their propagation as buddings on seedling rootstocks, the production of seedling families by artificial crossing and selfing of high-yielding trees, and the use of seed obtained by open pollination among selected high-yielding trees and of clonal seed from uncontrolled hybridization between buddings.

14.

LARTER, L. N. H.

575:633(72.92)

**Report of the Senior Botanist.**

Jamaica 27 July, 1944 : Pp. 9.

**Maize**

Selection of flint types for local use and the breeding work necessary for the production of synthetic varieties have been continued.

**Banana**

Breeding has been continued along the lines of previous years. Primary tetraploids are being raised from crosses between Gros Michel as female parent and various wild diploid varieties, and  $F_2$  secondary tetraploids by intercrossing the  $F_1$ . *M. nagensium* and Tagwin 3, an unnamed species from Burma, have been introduced into the breeding programme as male parents. Pollination of the group of *M. Cavendishii* varieties has been resumed; the semi-dwarf Giant Governor has been pollinated by six different varieties of two *Musa* species; no seed has been set, the group of *M. Cavendishii* varieties again appearing to be completely sterile.

Of the 80 seedlings selected for further trials the majority are primary tetraploids from  $F_1$  crosses. None are considered as showing outstanding promise. Seedlings from the cross Gros Michel x Pisan Lilan are a more desirable type than those from other crosses but a high proportion of this progeny shows susceptibility to Panama disease. Seedlings J.2871 and J.3247 from Gros Michel x Pisan Lilan, and J.3246 from Gros Michel x *M. flava*, show the most promise in finger weight and length.

15.

575:633(72.98)

**Annual report of the Department of Science and Agriculture, Barbados, for the year ending 31st March, 1944.** Pp. 14.

**Cotton**

Promising selections in comparison with the standard variety B.1 are under test.

**Sugar cane**

Over a hundred hybrid seedlings have been obtained. The work of increasing the variability of seedling material by interspecific crossing is being continued. Some of the selections from the B.41 series have shown immunity to inoculations of mosaic derived from B.2935 and B.34104.

**Pigeon pea**

Selection for yield in early and late maturing types was continued.

16.

575:633(93.1)

**Nineteenth annual report of the Department of Scientific and Industrial Research, New Zealand. 1945 : Pp. 65.**

**Wheat**

Advanced generation lines of Tuscan x Tainui continued to show promise. The hybrid Cross 7 x Tainui combines good agronomic characters with the highest standard of baking quality. Statistical and genetic investigations on the variation and inheritance of several economic characters and on the cytogenetics of certain aberrants have been continued. A critical study of methods of selection has been begun.

Trials have been made of varietal resistance or susceptibility to stem weevil and Hessian fly.

**Oats**

$F_8$  and  $F_6$  lines, respectively, have been selected for further testing from a cross between Resistance and Onward and between Algerian and Resistance.

**Ryegrass**

An attempt is being made to breed a blind-seed resistant variety of perennial ryegrass. Resistance and susceptibility have been found to be inherited characters.

Different types of the short-rotation or H1 ryegrass, developed by hybridization between perennial and Italian ryegrass, have been released for trial.

**Lucerne**

A strain of the spreading species, *Medicago glutinosa* has been mass-selected.

**Clover**

The possibility of producing a high yielding persistent strain by hybridization between Montgomery and broad-leaved red clover is being explored.

**Swede**

The hybrid Grandmaster x Sensation is under test.

**Potato**

Hybrid lines, consisting mainly of crosses involving local and imported commercial varieties and *S. andigenum*, are under observation. Some have out-yielded the control variety, Auckland Short Top, under conditions of virus infection.

**Flax**

The two main objectives of the breeding programme are the production of fibre and linseed varieties of high quality, resistant to wilt and rust. Many crosses have been made between Rio, the rust and wilt resistant linseed variety, and several fibre and two linseed varieties, most of these first crosses are in the  $F_6$  generation. A number of back-crosses to the fibre parents are now in the  $F_2$  and  $F_3$ .

**Phormium**

Industrial tests have been made of the varieties 56 and 301.

**Tobacco**

Breeding work to obtain mosaic resistant varieties has been continued. Hybrids showing resistance to black root rot have been back-crossed to the flue-cured parents.

**Kale**

Selections of crosses of marrow-stem kale with thousand-headed kale, cabbage and kohl-rabi, are under observation.

**Beans**

Trials of the resistance to bacterial wilt of 70 varieties have indicated that (1) all white-seeded varieties are highly resistant to wilt and also to anthracnose, (2) runner varieties are seldom seriously damaged in the pods by wilt although the foliage may show moderate attack, and (3) several coloured-seeded varieties are highly resistant.

**Peas**

Selection is in progress in the following hybrids of garden peas: William Massey x (Greenfeast x Greatcrop), William Massey x [(Greenfeast x Greatcrop).x Harrison's Glory], Greenfeast x a mosaic resistant rogue of Greenfeast, and the mosaic resistant Greenfeast rogue x (Greenfeast x Greatcrop).

Onward was crossed with William Massey, Greenfeast and Greencrop, to develop a higher yielding type of Onward suitable for canning.

Among the progenies of the crosses of Partridge with Lima, White Elephant and Black-Eyed Susan, made with a view to breeding an improved type of field pea, only selections of the cross Partridge x Black Eyed Susan have shown promise. In a further attempt to improve Partridge, this variety has been crossed with Mammoth Blue, Dutch Blue and the introduced variety Mansholts.

**\*GENETICS 575.1**

17. HUXLEY, J. 575.1(47)

**Evolutionary biology and related subjects.**

Nature, Lond. 1945 : 156 : 254-56.

An account is given of the present state of genetical research in the U.S.S.R., as seen by the delegates to the 220th Anniversary celebrations of the Academy of Sciences of the U.S.S.R. Work along neo-Darwinian lines at the various research institutions is described, but no attempt is made to deal with the theories of Lysenko.

18. BURNS, W. 575.1:582:581.5(54)

**Genetics, taxonomy and ecology.**

Indian J. Genet. Pl. Breed. 1944 : 4 : 2-7.

The interrelationship of genetics, taxonomy and ecology is discussed. The important bearing of work combining all three sciences upon the fundamental problems of evolution is emphasized.

19. DANIELLI, J. F. and 575.17:581.192:576.312.32

CATCHESIDE, D. G.

**Phosphatase on chromosomes.**

Nature, Lond. 1945 : 156 : p. 294.

By treating the giant salivary chromosomes of *Drosophila* with the techniques devised by Takamatsu and Gomori, bands of phosphatase have been detected which correspond fairly well to the loci of the Feulgen positive bands. It is suggested that this correlation may throw some light on the manner in which genes influence cellular activity.

20. FORD, E. B. 575.22

**Polymorphism.**

Biol. Rev. 1945 : 20 : 73-88.

A review is given of the present state of knowledge regarding polymorphism, which may be of two kinds, transient and balanced. Transient polymorphism is that which is manifested during the spread of a gene or gene system of positive value through a genetical population. Balanced polymorphism occurs (1) when natural selection favours genetical diversity, (2) when heterozygosity has a higher selection value than homozygosity, and (3) when a genetical mechanism favouring out-breeding, such as sexual differentiation or heterostyly, is operative. These examples are discussed in relation to ecological adaptation and clinal variation.

**\*CYTOLOGY 576.3**

21. CARR, J. G. 576.312.32:581.192

**Mechanism of the Feulgen reaction.**

Nature, Lond. 1945 : 156 : 143-44.

Experiments are described which indicate that the Feulgen reaction is not a specific test for desoxyribose nucleic acid. The characteristic mauve colour may be produced by staining a variety of substances with a weakly acid solution of fuchsin. Furthermore, the localization of the stain in nuclear preparations is consequent on the absorbing powers of the chromosomes, and is not a necessary indication of the locus of formation.

\* General studies, see also individual crops.

22. DARLINGTON, C. D. and JANAKI-AMMAL, E. K. 576.356.2:575.41  
**Adaptive isochromosomes in Nicandra.**  
 Ann. Bot., Lond. 1945 : 9 : 267-81.

The cytology of *N. physaloides*, which has a pair of isochromosomes, and of its derivative tetraploid and triploid strains, is described. It is believed that the isochromosomes have an adaptive value in so far as they result in genetical heterogeneity; chromosome-deficient individuals are characterized by delayed germination which may enhance the survival value of the species.

23. STEEDMAN, H. F. 578.6  
**Ester wax: a new embedding medium.**  
 Nature, Lond. 1945 : 156 : 121-22.

Details are given of a new microtome technique in which the embedding medium used contains diethylene glycol distearate as its principal ingredient.

24. JOHNSON, L. P. V. 578.6:576.353:634.97  
**A rapid squash technique for stem and root tips.**  
 Canad. J. Res. 1945 : 23 : Sect. C.: 127-30.

A method of preparing permanent slides for the study of chromosomes in shoot and root tips is described, which has proved satisfactory in cytological examinations of 20 species of forest trees, mostly belonging to the Pinaceae.

25. MAHESHWANI, P. 581.481:576.356.52  
**Origin of haploid-diploid twin embryos in angiosperms.**  
 Nature, Lond. 1945 : 156 : 173-74.

A brief review is given of the various ways in which haploid-diploid twins may arise in angiosperm seeds.

#### \*PLANT DISEASES AND PESTS 632

26. SANSOME, E. 632.421.9:577.8:575.125  
**Heterokaryosis and the mating-type factors in Neurospora.**  
 Nature, Lond. 1945: 156: p. 47.

Although different strains of the same mating type of *N. crassa* will produce heterocaryons, all attempts to obtain heterokaryosis between strains from opposite mating types have failed. This is explained by the supposition that nuclear association between different mating types occurs only at the time of sexual reproduction and not during vegetative development.

27. HOPKINS, R. H. 632.422.3:575.243:537.5:581.04  
**Some prospects in yeast research.** 632.422.3:575.12:582  
 J. Inst. Brew. 1945 : 51 : 138-40.

A discussion is given of the results of recent research, which indicate the possibilities of obtaining a new and sound system of classification of yeasts based on genetical data, and of producing improved industrial forms by hybridization and various methods of artificial mutation.

28. SUBRAMANIAM, M. K. 632.422.3:576.356.5:581.04  
**Induction of polyploidy in Saccharomyces cerevisiae.**  
 Curr. Sci. 1945 : 14 : p. 234.

Investigation of the chromosome number of *Saccharomyces cerevisiae* (strain S.C.9) and a preliminary study of the effect of acenaphthene have been previously described (cf. *Plant Breeding Abstracts*, Vol. XV, Absts 1234 and 1233 respectively). The present note gives a further description with figures of the effect of acenaphthene in the production of polyploids.

#### ECONOMIC PLANTS 633

29. **Speeding up plant improvement.** 633:576.356.5:581.04:575(42)  
 Mon. Sci. News 1944 : No. 39 : 2-3.

The use of colchicine and other organic substances in plant breeding is briefly described. Particular

\* General studies, see also individual crops.

reference is made to the successful method of accelerating growth of seedlings during colchicine treatment in the case of naturally slow-growing plants such as fruit and forest trees, which has been developed at the John Innes Horticultural Institution.

30. HUNTER, H. 633.00.14-1.531.12(42.59)  
**The National Institute of Agricultural Botany.**

J. Inst. Brew. 1945 : 51 : 189-94.

The history and work of testing crops and varieties and the production of pure certified seed carried out at the National Institute of Agricultural Botany, Cambridge, is described in general, and with particular reference to barley.

#### CEREALS 633.1

31. ARMSTRONG, S. F. 633.1(42)  
**Cereal varieties for autumn sowing.**

J. Minist. Agric., Lond. 1945 : 52 : 295-97.

Varieties of wheat, oats and barley are discussed, in the light of the most recent data concerning their suitability.

#### WHEAT 633.11

32. MACINDOE, S. L. 633.11:575:007  
**Centenary of the birth of William Farrer, 1845-1906.**

J. Aust. Inst. Agric. Sci. 1945 : 11 : 72-73.

An account is given of the pioneer work of William Farrer in wheat breeding.

33. BLUNT, D. L. 633.11:575.12(67.62)  
**Agricultural Department Annual Report, Colony and Protectorate of Kenya 1943** (1944) : Pp. 6.

At the Plant Breeding Station, Njoro, as in previous years, work has been largely in connexion with the production of improved and rust resistant wheat varieties. A new medium early variety, No. 291, has been developed from the cross Australian 26.A x 58.F (L.17), which should be valuable in those areas where a quicker maturing variety than 117.A is required. A large number of hybrids are under observation.

34. NANDA, K. K. and CHINNOY, J. J. 633.11:581.143.26.035.1:581.162.5(54.5)  
**Effect of photoperiodic treatment on pollen fertility.**

Curr. Sci. 1945 : 14 : p. 241.

During the course of investigations on phasic development of wheat at the Imperial Agricultural Research Institute, New Delhi, it has been observed that the formation of normally functioning gametes depends upon the preliminary phasic changes in the gametophytic cells produced by the photoperiodic treatment. Graded seeds of three varieties of *Triticum vulgare*, I.P.165, I.P.52 and P.C.591, were germinated and kept for the first 12 days under five different initial light treatments. At the end of this 12-day treatment the plants were exposed to short, normal and long day photoperiods until anthesis. Pollen sterility increased with both long and short photoperiods. The initial light treatment was also found to have an appreciable effect on pollen sterility, the long day treatment increasing sterility.

35. SOUTTER, R. E. 633.11-1.531.12(94.3)  
**Production of seed wheat.**

Qd Agric. J. 1945 : 61 : p. 75.

Methods of maintaining varietal purity in commercial seed production are briefly described.

36. PETURSON, B., NEWTON, M. and WHITESIDE, A. G. O. 633.11-2.452-1.557:664.641.016(71)  
**The effect of leaf rust on the yield and quality of wheat.**

Canad. J. Res. 1945 : 23 : Sect. C : 105-14.

The results are reported of field and greenhouse experiments carried out at Winnipeg to determine the effect of leaf rust upon yield and quality. In the field experiments, heavy infection of leaf rust caused significant reductions in yield and bushel and kernel weights, in the four varieties tested, viz., Thatcher, Apex, Renown and Regent; none of the observed differences between rusted and control plants in number of kernels per head were, however, significant.

A variable effect on the protein content of the grain was shown; in one year percentage protein content increased, in two other years it decreased. The milling and baking quality was not adversely affected, except for a slight reduction in flour yield and an increase in yellow pigment in the flour. With the exception of the variety Renown in one year, the flour milled from rusted samples was superior in baking strength as indicated by loaf volume.

In the greenhouse experiments during two years with the variety Thatcher, leaf rust infection produced significant reductions in yield, kernel weight, number of kernels per head, straw weight, and number of fertile tillers. An increase in the percentage of protein in the grain, leaves and straw was observed.

37. McLoughlin, D. E. and  
Sansom, T. K.

633.11:664.641.016(68.9)

**Wheat production in Southern Rhodesia.**

Rhod. Agric. J. 1945 : 42 : 222-42.

Descriptions are given of the most important varieties. The need for high yielding varieties with improved baking quality is briefly discussed; recently developed wheats with good milling and baking qualities unfortunately do not give sufficiently high yields.

**OATS 633.13**

38. DERICK, R. A. and  
HAMILTON, D. G.

633.13(42.59)

633.16(42.59)

**Varieties of winter oats and winter barley.**

Fmrs' Leafl. Nat. Inst. Agric. Bot. Cambridge 1945 : No. 9 : Pp. 4.

Descriptions are given of recommended varieties.

39. DERICK, R. A. and  
HAMILTON, D. G.

633.13:581.148:631.521.6

**Shattering in oats.**

Sci. Agric. 1945 : 25 : 426-31.

In a study of several varieties of Canadian oats, it has been found that varietal differences in resistance to shattering exist, and that the machine shaking of the panicles gives a satisfactory index of varietal resistance. High resistance to shattering has been shown by Dasix and Ajax, considerable susceptibility by Banville, Ardri and Mabel. No indication was obtained that shattering in oats is associated with early maturity, or, except in the true cluster type of variety, e.g. Banville, with type of panicle. From an investigation of six varieties it is shown that the smaller the angle of spikelet attachment to the peduncle the greater the resistance to shattering. Resistance to shattering also appears to depend upon the area of basal attachment of the spikelet and the thickness of the sclerenchyma surrounding the spikelet base.

40. ROBINSON, J. F.

633.13.00.14(42.9)

**A summary of oat variety trials at the College Farm, Aber, 1933-44.**

Welsh J. Agric. 1945 : 18 : 59-71.

The following varieties have been grown for three or more seasons during the period 1933-44: Marvellous, Golden Rain II, Onward, Star, Eagle, Victory, S.84, Resistance, Early Miller, Royal Scot and Record. The yields obtained indicate that Eagle and Onward are outstanding high yielding varieties. Distinction has been made between lodging occurring before and after ripening. With regard to lodging before ripening, six varieties have shown more than average straw strength, viz. S.84, Early Miller, Eagle, Marvellous, Star and Record.

An investigation has been made of the relative weights of husk and kernel. In general, Star, Victory, Golden Rain II, Eagle and Early Miller possess a higher kernel/husk ratio than the other varieties. Further investigations extending over a period of 20 years have indicated that the husk and kernel weights vary independently of each other from year to year, certain varieties appearing to be more susceptible to environmental changes than others.

**RYE 633.14**

41.

633.14:581.143.26.03(42)

**Contributions to the study of vernalization.**

Mon. Sci. News 1945 : Nos 9-10 : p. 8.

Plants of winter rye germinated at 1° C. and sown early in May produce seven leaves before the beginning of ear formation, while plants not subjected to vernalization and sown at the same time grow 25 leaves, an acceleration of 18 weeks in ear formation resulting from the treatment.

**MAIZE 633.15**

42. McKEON, C. J. 633.15-1.531.12:575.42(94.3)  
**Maize seed selection.**  
 Qd Agric. J. 1945 : 60 : 261-68.

The importance of careful field selection is stressed, and the aims of selection with regard to several characters are described.

**BARLEY 633.16**

43. BISHOP, L. R. 633.16:581.142:581.6(42)  
**Second memorandum on barley germination.**  
 J. Inst. Brew. 1945 : 51 : 215-24.

The comparative study of germinating capacity in 13 varieties indicates that the degree of dormancy is a factor of direct importance in the determination of malting quality.

**RICE 633.18**

44. RODDAN, G. M. 633.18(66.51)  
**A report of rice cultivation in the Gambia (with suggestions for development).**  
 Develop. Welfare Gambia 1943 : Chap. VII Agric., Sess. Pap. No. 2 : 1-18.

In an appendix particulars are tabulated of over 50 local and introduced rice varieties, collected on an expedition made along the banks of the River Gambia from Bathurst to Basse to examine methods of cultivation, with a view to improvements in yield of existing regions of cultivation and the development of idle districts. Data are given of grain characters, place of collection, type of locality (upland or tidal swamp), and duration. It is considered that the yields from existing areas under cultivation can be increased by the introduction of more satisfactory varieties by about the amount of the average imports per annum.

45. MITRA, A. K. and 633.18:575(54.3)  
 GUPTA, P. S.  
**Production of more rice per acre in the United Provinces.**  
 Indian Fmg 1945 : 6 : 398-402.

A brief description of the work of producing improved varieties of paddy rice is included. The improved varieties yield 9-55% more than the local varieties.

46. KADAM, B. S. 633.18:575(54.7)  
**Rice in Bombay.**  
 Indian Fmg 1945 : 6 : 51-54.

The types of rice cultivated in the different rice growing zones are described, and the achievements in producing improved strains at the rice breeding stations of Karjat and Mugad, and the Kumta and Ratnagiri experimental farms, are outlined. In an appendix various data of 24 improved strains are tabulated.

47. 633.18:575.42(54.8)  
**Administration report of the Agricultural Department, Government of Travancore, 1919 M.E.**  
 Trivandrum 1945 : Pp. 36.

Selection work in rice was continued at the stations at Moncompu and Adoor. Promising strains selected from the following varieties are under test: the widely cultivated varieties, Kallada Samba and Chetty-viruppu, and the local varieties, Karuthachuttiyarian, Cheriyachuttiyarian, Valiavella and Kochuvithu.

48. FOTIDAR, M. R. 633.18:581.162.32(54)  
 633.18:575.11.061.6(54)  
**Natural cross-pollination in paddy.**  
 Indian Fmg 1945 : 6 : 15-16.

Natural cross-pollination under conditions in Kashmir was determined as 01% in an experimental plot in which non-pigmented and pigmented varieties were grown in a suitable design; the glumes open between 10 and 12 a.m. The pigmented character was dominant to the green, a dihybrid ratio being obtained.

## FORAGE GRASSES 633.2

633.2(94.1)

49. CARISS, H. G.

### The utilisation of cereals for green fodder.

J. Agric. W. Aust. 1945 : 22 : 154-62.

Marked differences have been found between different cereal crops and between varieties of each cereal in their capacity to recover from grazing and give satisfactory yields of grain or hay. In general, barley is more suitable for green fodder than oats and rye, which are in turn more suitable than wheat. Varieties which have good stooling capacity are usually more satisfactory than types with poorer stooling capacity. As a result of grazing trials, the oat varieties Fulghum, Dale, Ballidu and Wongan and the barley variety Atlas are recommended.

50. GOOSSENS, A. P. and

PAPENDORF, M. C.

633.23:582(68)

### A revision of the genus *Agrostis* Linn. in South Africa.

S. Afr. J. Sci. 1945 : 41 : 172-85.

A revision of the genus *Agrostis* in South Africa and a key for the identification of the species are given.

51.

### Research and the farmer. VI. Seeds.

Mon. Rep. Minist. Agric. N. Ire. 1945 : 20 : 162-64.

The difficulties of the commercial seed production of pedigree ryegrass strains are briefly discussed, with reference to the research work aimed at their solution.

52. CORKILL, L. and

ROSE, R. E.

633.263-2.421-1.521.6:575(93.1)

### Observations on susceptibility of perennial rye-grass to blind seed disease.

N.Z. J. Sci. Technol. 1945 : 27 : Sect. A : 14-18.

Susceptibility to blind-seed disease caused by the fungus *Phialea temulenta* Prill. et Delacr. was found to be significantly lower among Southland old pasture lines than among certified lines. The results of crosses between Southland resistant plants and between susceptible plants of the certified lines indicated that resistance or susceptibility is inherited. The highly resistant plants selected from the Southland lines and the progenies of crosses between them were agronomically inferior. In these progenies, however, some plants occurred superior in agronomic characters to their parents. These resistant plants are to be crossed with plants from certified lines in attempt to combine blind-seed resistance and the agronomic characters of the present certified strains.

53. BLAKE, S. T.

### Monographic studies in the Australian Andropogoneae, Part 1, including revisions of the genera *Bothriochloa*, *Capillipedium*, *Chrysopogon*, *Vetiveria* and *Spathia*.

Univ. Qd Pap., Dep. Biol. 1944 : 2 : No. 3 : Pp. 62.

A revision of the following genera of the Australian Andropogoneae is presented: *Bothriochloa*, *Capillipedium*, *Chrysopogon*, *Vetiveria* and *Spathia*. New species of other genera which have been less completely studied are also described.

## ROOTS AND TUBERS 633.4

54. HUDSON, P. S.

633.491:575(42)

### Work on the South American potato collection up to 31st December, 1944.

Fifteenth Ann. Rep. Exec. Coun. Imp. Agric. Bur. 1943-1944 (1945) : 22-23.

The work on the systematics and cytology of the South American potato collection is almost completed. In testing for reaction to virus diseases, *Solanum adjuscōense*, *S. Antipoviczii*, *S. calcense*, *S. Garciae*, *S. Jamesii* and many samples among *S. andigenum* have shown promise. Additional clones have been found to be highly resistant or immune to blight. Nearly 1500 lines have now been tested for frost resistance, and testing of the original collection is almost complete. 216 lines exhibiting varying degrees of resistance have been selected for further test. Lines which have given no reaction to wart are to be tested again before being considered immune. Certain lines appear to be immune or highly resistant to eelworm attack. The analysis of vitamin C and dry matter contents is being continued. In the work on seed production seed of nearly all the fertile varieties has now been obtained; hybridization between the highly sterile varieties and pollen fertile forms has been initiated.

55. M'INTOSH, T. P. 633.491:575.22:575(41)  
**Variations in potato varieties.**

Scot. J. Agric. 1945 : 25 : 125-32.

Colour variations and variations affecting yield, such as bolters and wildings, are described and their possible causes discussed. Since varieties differ in stability it is suggested that breeding for this quality offers scope.

56. RAYNER, R. W. 633.491:581.143.26.035.1(67.6)  
**Notes on the effect of day length on potato yields.**

E. Afr. Agric. J. 1945 : 11 : 25-28.

The results of several investigations on photoperiodism in the potato are discussed, in relation to the fact that satisfactory yields are obtainable at the higher altitudes of East Africa. Emphasis is laid upon the necessity for due consideration of the effect of temperature and light intensity in analysing photoperiodic response. Certain contradictions in the literature appear to be due to the use of different varieties by different workers; the evidence suggests that the yield in temperate zones of at least some varieties is not depressed by a "short" day of ten hours' duration, as in the case of late maturing varieties. The utilization by the majority of investigators of a ten-hour or shorter light period as a standard short day in determining photoperiodic response is critically examined in view of the fact that the so-called short tropical day is of twelve hours' duration. Attention is further drawn to the possibility that the reaction of plants grown for only one generation under a given day-length may not necessarily be the same as that of plants subjected for several generations to the particular day-length.

57. PUSHKARNATH. 633.491:581.165:575(54)  
**Potato sprouts as a source of "seed".**

Curr. Sci. 1945 : 14 : 236-37.

A method of using sprouts is described which has been found useful in the rapid development of stocks of new varieties at the Simla Potato Breeding Station.

58. POLLARD, A., 633.491:581.6(42)  
 KIESER, M. E.,  
 CRANG, A. and  
 WALLACE, T.

**Factors affecting quality in potatoes.**

Rep. Agric. Hort. Res. Sta., Long Ashton, Bristol, 1944 : 184-99.

A study has been made of the cooking quality of potatoes grown at eight centres, with special reference to blackening when boiled. The varieties Majestic, King Edward, Gladstone, Arran Banner and Kerr's Pink were found to differ in general quality and susceptibility to blackening. The effect of location and variety upon quality were more important than that of manurial treatment. In a preliminary study of the effect of planting time, Majestic planted late showed more blackening than when planted at the normal time, while in King Edward little effect was observed. It is suggested that the choice of suitable varieties should considerably alleviate the problem of blackening upon boiling.

59. ELLENBY, C. 633.491-2.6-1.521.6(42)  
**Susceptibility of South American tuber-forming species of *Solanum* to the potato-root eelworm *Heterodera rostochiensis* Wollenweber.**

Emp. J. Exp. Agric. 1945 : 13 : 158-68.

Experiments have been carried out during the years 1941-3 to explore the possibility of obtaining the reaction of "insusceptibility" to eel-worm attack among the South American tuber-forming species of *Solanum*. The tubers tested formed part of the Empire Potato Collection, at the Imperial Bureau of Plant Breeding and Genetics, Cambridge. The experiments were of three main types: (1) field trials, (2) hatching trials with leachings from pots containing growing potato plants, and (3) hatching trials with root-excretions obtained directly from the roots.

Nearly 40 South American species have shown susceptibility to eelworm attack when grown in soil infected with cysts. In the 1943 field trials cysts were not found on the roots of the two specimens of *Solanum pampasense*; further trials are needed to establish the reaction of this species. In general, however, most of the plants of the species tested appeared to be less susceptible than the *S. tuberosum* variety, Great Scot, used as control. Fewer cysts were formed and in some cases a species was classed as susceptible, on the basis of a single cyst on its roots; in

addition, the cysts were often more immature than the cysts on the roots of the control. The hatching trials with these species and a number of others, comprising a total of 56 forms, have indicated that in most cases root-excretions from these plants are much less effective in stimulating larval emergence than those from Great Scot; the species *S. Fendleri* and *S. depexum* stimulated no emergence at all. A further experiment demonstrated that cysts produced on the South American species, *S. calcense*, are markedly less viable than those of Great Scot. Preliminary tests with the same material have indicated that from root-masses showing equal oxygen consumption the quantity of root-excretions produced by the South American species is less than those produced by Great Scot, or is different in type, suggesting a genetical difference in root-excretions between the two species. Such differences in susceptibility appeared to exist regardless of the possible factor of differences in plant vigour. The search for an "insusceptible" species is to be continued, but the first results obtained clearly emphasize that relative immunity rather than relative insusceptibility, should be the main objective.

### FIBRES 633.5

60.

633.51:575(54.7)

#### What the scientists are doing. A new cotton for Mathio tract.

Indian Fmg 1945 : 6 : p. 273.

A brief account is given of the work of improving the local cotton Mathio (*G. arboreum* var. *neglectum*), a coarse early maturing type cultivated in the Ahmedabad and southern Kathiawar districts. The Bengal strain, C.520, has proved superior to Mathio in yield, ginning percentage and quality in tests during the past few years. Further work has as its aim the development of selections superior to C.520 from the local bulk and from hybrids between selections of Jarila and Mathio. The selection S.31 from the local bulk has given good yields of fine cotton during the last two years and has been named Pratap; it is as early maturing as Mathio.

61.

KADAM, B. S.

633.51:575(54.7)

#### New strains for old crops in Bombay. Part I. Cotton.

Indian Fmg 1945 : 6 : 353-56.

A brief description is given of the work of breeding improved strains in the three chief cotton-growing regions of Bombay, viz., Gujarat, Khandesh (Deccan) and Karnatak. In all these regions cottons with increased yields and ginning percentage are now available.

62.

SANKARAN, R.

633.51:575(54.7)

#### Long staple cotton in Sind.

Indian Fmg 1945 : 6 : 257-59.

The selections Sea Island 2-4, Boss III-16 and Ashmouni 27 from the imported long-staple Sea Island and Egyptian cottons failed on account of climatic and other factors. The attempt to develop a long staple cotton from American Upland types has also given unsatisfactory results. Commercial medium-stapled cottons have been selected from Punjab-American types, viz., Sind-American 98, Sind Sudhar and M4. Hybridization between the hardiest existing Upland cottons, such as Sind Sudhar and M4, and selections from imported long-stapled American cottons is now in progress with the object of developing commercial long-stapled varieties. The hybrid progenies so far obtained possess long staple but also exhibit the jassid susceptibility and other undesirable characters of the imported parents. The range of variability in the progenies, however, points to the possibility of selecting the desirable type.

63.

RAMIAH, K. and

NATH, B.

633.51:575.11.061.63(54)

#### Genetics of two new anthocyanin patterns in Asiatic cottons.

Indian J. Genet. Pl. Breed. 1944 : 4 : 23-42.

A description is given of two new alleles of the  $R_2$  series which determines the variation and distribution of anthocyanin pigment in the vegetative parts of the plant and the presence and absence of the deep purple-red petal spot. These new alleles are (1) weak thumb-nail red spotted, designated  $R_2^{ws}$ , and (2) green spotless-2, designated  $R_2^{ro}$ . It is proposed to rename the allele  $R_2^{ro}$  defined by Silow and Yu (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 686) green spotless-1. Both these new alleles have been found in the analysis of *G. arboreum* material.

The results of various hybridizations indicate that the main phenotypic difference between the sun-red spotted alleles in *G. herbaceum* and *G. arboreum*, viz., the presence of non-pigmented

stamen filaments and pigmented, respectively, is attributable to different modifier levels in the two species.

The origin of the two new anthocyanin patterns and other anomalous segregates is considered to be the result of mutation in a multiple allelomorphic gene rather than the result of crossing-over.

64. PAVATE, V. 633.51:575.42(54)

**Cultivation of Gadag 1 (upland) cotton.**

Indian Fmg 1945 : 6 : 112-13.

A description is given of the improved strain of Dharwar-American cotton, Gadag 1, cultivated mainly in the Gadag and Ron talukas and adjoining states in the Dharwar region.

65. A....., N. 633.51:581.6(54)

**What the scientists are doing. Combing of Indian and Kampala cottons.**

Indian Fmg 1945 : 6 : 369-70.

The suitability of Indian cottons, after combing treatment, for some of the purposes for which foreign cottons had previously been used, has been investigated by an analysis of several varieties in comparison with the African cotton Kampala. Differential response of cotton varieties to combing was observed. The properties conducive to improved spinning quality with combing treatment are analysed. The use of suitable Indian cottons, where combing machinery is available, is advocated.

66. GULATI, A. N. and 633.51:581.6(54)

AHMAD, N.

**The maturity of cotton fibre.**

Indian Fmg 1945 : 6 : 9-11.

Various factors affecting the maturity count of fibres are discussed. In an analysis of fibre maturity of the strains Cwn. 520, Bani and Malvi, and the F<sub>1</sub> hybrids between them, percentage of mature fibre was found to be an inherited character, some of the crosses showing hybrid vigour in a higher percentage of mature hairs than either parent. Varietal and specific variations are briefly described. Varieties of *Gossypium arboreum* give the highest mature fibre count, varieties of *G. hirsutum* the lowest, and varieties of *G. herbaceum* intermediate values.

67. 633.51-1.421(72.98)

**Annual report on the Agricultural Department, St Vincent 1943 (1944) :**

Pp. 12.

The introduction of the balanced incomplete block method of statistical analysis in the trial of VH strains of cotton has made possible the examination of a considerable number of progenies with relatively high precision, with respect to yield, bolls per plant, seeds per boll and lint per seed. The gain in efficiency in making yield comparisons was estimated as 152% in comparison with the randomized complete block design.

68. BOZA BARDUCCI, T., 633.51-2.7-1.521.6:575.42(85)

GARCÍA RÁDA, G. and

WILLE, J.

**Control of internal boll rot of the cotton plant, caused by insect punctures (*Dysdercus* sp.), through selection of resistant strains.**

Nature, Lond. 1945 : 156 : 235-36.

Preliminary work is reported on the selection of Tangüis cotton strains for resistance to the cotton stainer *D. ruficollis* L.

69. AHMAD, N. 633.51.00.14(54)

**Technological reports on trade varieties of Indian cottons, 1944.**

Technol. Bull. Indian Cott. Comm. 1944 : Ser. A : No. 61 : Pp. 83.

The results are presented of the 1944 spinning tests on samples of 31 representative commercial varieties of Indian cotton, and three varieties of African cotton, A. R. Kampala, A. R. Busoga and A. R. Jinja. The introduction includes a survey of the different varieties sampled in the tests since they were first made of the 1929-30 crop.

70. AHMAD, N. 633.51.00.14(54)  
**Technological reports on standard Indian cottons, 1944.**  
 Technol. Bull. Indian Cott. Comm. 1944 : Ser. A : No. 62 : Pp. 103.

In the introduction to the report, the wide range of fibre properties and spinning capacity among Indian cottons, corresponding to the range of climate and other conditions of cultivation, is emphasized, and a table is given summarizing the production and staple length of the Indian cottons according to trade descriptions. The main objectives of the tests on standard Indian cottons, in addition to supplying standards of comparison in the evaluation of new types developed by plant breeders, are described as follows: (1) since these tests are carried out in each season on the same varieties grown under as similar conditions as possible, a comparison of the results of the standard tests with the results of supplementary trade tests serves as basis of estimation of the entire Indian crop and the extent to which a commercial variety differs in quality from the pure strain; (2) the provision of data for the study of seasonal variation in fibre properties and spinning performance; and (3) the correlation of the fibre properties of Indian cottons with their spinning performance. The problem of the size of sample is also discussed. Extensive tests have indicated that a 10 lb. sample is sufficient for a satisfactory spinning test.

A detailed report is presented for each of the 19 standard varieties, each report being subdivided into the following five sections: (1) agricultural details, (2) grader's report, (3) fibre properties, (4) spinning tests, and (5) remarks in which the results of sections (3) and (4) are summarized and discussed with particular reference to waste percentages, quality of grain, seasonal variation in the fibre properties and spinning performance. Tables are given summarizing the results of analyses of fibre properties of the standard cottons for the years 1926-44, and the results of spinning tests during the period 1934-44.

71. MILLIKAN, C. R. 633.52-2.484-1.521.6:575.42(94.5)  
**Wilt disease of flax.**  
 J. Dep. Agric. Vict. 1945 : 43 : 305-13, 354-61.

The fungus causing wilt disease in the Drouin district of Victoria has been identified as *Fusarium oxysporum* f. *Lini*. A study was made of the reaction of numerous varieties to this wilt when grown in naturally infected soils maintained at a temperature of 75° F., which condition was found to be the limit of favourable temperature for the development of the wilt. Several varieties showed a high degree of resistance under these conditions. Strains of Liral Crown, Liral Prince, Royal and J.W.S. have been selected in the temperature tanks, showing a greater resistance to wilt than the parent varieties under similar conditions. The selections of Liral Crown have given a high degree of resistance in both winter and summer field sowings. Liral Prince Selection 7 has exhibited promising resistance in a winter sowing test. Evidence was obtained of the occurrence of physiological strains of *F. Lini*.

### SUGAR PLANTS 633.6

72. MCINTOSH, A. E. S. 633.61:575(88)  
**Report on a visit to British Guiana, July and August, 1944.**  
 Bull. B.W.I. Cent. Sug. Cane Breed. Sta. 1944 : No. 27 : Pp. 8.

A survey is given of the trend of commercial planting of sugar cane varieties during the period 1929-44 in relationship to the breeding work at the Sophia Sugar Experiment Station, British Guiana, and of the methods of breeding and selection practised. During this period, none of the seedlings developed by the Sophia Station has replaced to any noticeable extent the old standard varieties Diamond 10 and P.O.J. 2878, in spite of the fact that several of these seedlings have been released for the establishment of plantation nurseries and a few have been recommended for extensive commercial planting. In the author's view, two of the more recently produced seedlings, D.14/33 and D.14/34 are better canes than these standard varieties. Among other recommended varieties, D.49/33 and D.166/34 are not considered reliable for commercial planting.

The present breeding material at the Sophia Station consists of a wide range of types derived from crosses between several *Saccharum* species and intergeneric crosses between species of *Saccharum* and *Sorghum*. The disadvantages in hybridization work of not insisting upon male sterility in mother plants, as is the present practice, are emphasized.

The use of Barbados seedlings in British Guiana is discussed. It is pointed out that canes were imported from the Barbados Cane Breeding Station before the successful results of the nobilization work were achieved, which produced canes of much greater vigour and range of adaptability; these early imported canes, while commercially successful in Barbados, failed in British Guiana, and the authorities ceased to import any more canes.

It is recommended that, with a view to deciding the issue whether the Barbados Station would be better suited to produce commercial canes than the Sophie Station, the seedlings B.3337, B.34104, B.37161, B.37172, B.4098 and B.41227, which show a wide range of adaptability to conditions in the British West Indies, be tested and compared with the most promising seedlings of the D. series.

73.

633.61:575(94.3)

**Bureau of Sugar Experiment Stations. Distribution of new varieties.**

Aust. Sug. J. 1945 : 37 : p. 163.

The new varieties, Q.48 and Q.49, are available for distribution in the Bundaberg and Gin Gin districts, developed from the crosses P.O.J. 2725 x Co.290 and P.O.J. 2878 and Co.290, respectively. Q.48 is a one year type of cane, Q.49 is suitable as either a one-year or stand-over cane. Both varieties are resistant to Fiji and downy mildew diseases, and no mosaic has yet been observed in either variety.

74.

BAIN, F. M.

633.61.00.14(72.98)

**Field experiments on sugar cane in Trinidad. Annual report for 1944.**

Sugar-cane Investigation Committee of Trinidad 1945 : 1-44.

BAIN, F. M. and

ROSS, R.

**The sugar-cane variety situation in Trinidad in 1944.**

Ibid. 1945 : 45-53.

The results are reported of 36 varietal trials in which 26 varieties were included, mostly from Barbados. Five of the varieties of the 1938 series were reaped for the first time in the 1944 trials. The varieties were considered in relation to different soil types, based upon differences in moisture. The main conclusion was reached that, in addition to B.34104 and B.3337, which varieties have already been planted widely on a commercial scale, B.37161, B.37172, and to a lesser extent B.37193, are suitable for trial in small scale commercial plantings on all the soil groups.

A comparison has been made between the yields per acre of the newer varieties, B.34104, B.3439 and B.3337, with those of the other standard canes, B.H.10(12) and Uba, when grown under large scale conditions; the data are discussed in the second paper. From the results obtained under conditions during the 1944 season the following conclusions were reached: (1) the variety B.34104 has on the average given the best results, particularly on soils of medium fertility; (2) the extensive planting of B.3439 is not justified; (3) on soils of good fertility the wholesale replacement of B.H.10(12) by newer varieties is not necessary; and (4) the problem of unsatisfactory yields on the poorer soils is a matter of soil regeneration rather than the planting of new varieties.

75.

POSNETTE, A. F.

633.689-2.8-1.521.6:575.42(66.7)

**Root-rot of cocoyams (*Xanthosoma sagittifolium* Schott).**

Trop. Agriculture, Trin. 1945 : 22 : 164-70.

Field experiments have been carried out in the Gold Coast to investigate the nature of root-rot disease in *Xanthosoma* and to discover methods of control. In resistance trials of recent introductions, only *X. violaceum* var. Yautia Palma proved to be highly resistant, but this variety is inedible. Individual plant selection among local varieties, however, appears to offer possibilities of obtaining less susceptible forms.

**STIMULANTS 633.7**

76.

BATT, R. F. and

MARTIN, H.

633.71:581.6:575(42)

**The home-production of nicotine.**

Rep. Agric. Hort. Res. Sta., Long Ashton, Bristol 1944 : 140-44.

A strain of *Nicotiana rustica* and two strains of *N. Tabacum* were grown in the greenhouse and out-of-doors, and the leaf yield and alkaloid content were determined. The highest nicotine

content was disappointingly low, even when the plants were headed and disbudded in order to promote increase in nicotine content of the leaf. The highest nicotine content was obtained from headed and disbudded plants of *N. rustica* grown in the greenhouse, and was calculated at 65.5 lb. per acre. Under war-time conditions the labour involved in restricting growth precludes the project of home-grown tobacco. It is suggested that under normal conditions new strains with higher nicotine content may be obtained by selection, and that the performance of the flowered plants and the propensity of the variety to form axillary growth should be considered as criteria in selection besides the nicotine content.

77.

633.72:575(54)

**Indian Tea Association. Scientific Department, Annual Report by the Director, Tocklai Experimental Station 1944 : Pp. 11.**

Cross-pollination of selected clones has been continued. An average of 600 cuttings have been taken from each of 25 selected bushes; the clones finally selected will provide a source for raising new seed baris. Data have been obtained, though not yet statistically analysed, on the vigour of the bushes of a single clone.

78.

GILBERT, S. M.

633.73:575.42(67.82)

**The Coffee Research and Experiment Station, Tanganyika Territory : a brief survey of the first ten years' work.**

Emp. J. Exp. Agric. 1945 : 13 : 113-24.

An account is given of the main activities during the years 1934-43 of the Coffee Research Station at Lyamungu in the Northern Province of Tanganyika, with the exception of the studies of the soil and of the control of diseases and insect pests.

In the first years large scale uniformity trials showed the extreme variability of the material, and gave promise of success in selecting promising strains within the already available material. The decision was therefore made to study methods of vegetative propagation, with a view to propagating promising mother trees and obtaining mass clonal material for experiments.

At the outbreak of war 30 blocks comprising 20,000 trees all on the single-stem growth system were being investigated; among these approximately 100 trees have been located that are deserving of detailed study. In selection work the main characters that are being studied over a minimum period of six years are: yields of cherry, parchment, and clean coffee per tree; percentage of pea berry in the clean coffee; size and shape of bean; and the weight and density of individual beans. Observations are also made as to tree type, colour of growing-tips of shoot, growth, and the space occupied per tree. Samples of potential selections are sent to commercial liquorers for reports on the quality of the fruit. One seedling selection has yielded 8.5 cwt. of parchment coffee per acre in its third year, which on testing proved to be of outstanding quality. It is emphasized that it is not yet certain whether the differences in yield which may occur between the progeny of potential selections are genetic or due to the environment.

Several experiments have been concerned with various cultural improvements. As a result of four years' uniformity trials the following conclusions regarding technique for experiments on *Coffea arabica* seedlings have been reached: (1) a convenient plot size consists of 16-20 trees with a standard spacing of 9 x 9 sq. ft.; (2) the Latin square of 6 x 6 plots is an efficient lay-out, as is also the method of randomized blocks if repeated at least 8 times; (3) on account of the irregular periodicity of yields of neighbouring trees, from year to year, preferably 3-4 years' natural yields of plots should be obtained before treatments are applied in precise experiments; (4) means of three years' natural yields give a substantially lower plot error, and considerably increase the precision when used in the method of covariance; and (5) repetition of an experiment in several localities and over several seasons is essential.

79.

633.74-2.7-1.521.6:575.42(42)

**Thrips**

Mon. Sci. News 1944 : No. 33 : p. 3.

A description is given of the programme of selecting for resistance to thrips in cacao, which has recently been initiated at the Entomology Department of the Imperial College of Tropical Agriculture, Trinidad.

80. SALMON, E. S. 633.79:575(42)  
**Twenty-eighth report on the trial of new varieties of hops, 1943.**  
 J. Inst. Brew. 1945 : 51 : 224-31.

A total of 131 new varieties were tested, one of which, the late variety EE69, cropped at the rate of  $26\frac{1}{2}$  cwt. per acre and 25 at the rate of  $20-24\frac{1}{4}$  cwt. per acre, in spite of the very dry growing season.

The new early varieties R4/80a, OT22 and FF21, and the mid-season hops, Brewer's Stand-by (HH44) and WFA12 (a clone of Northern Brewer), gave a high analysis of resin contents. OM26, a bud-sport of Nonsuch (OB53) was richer than its parent in both  $\alpha$ - and  $\beta$ -resins, further confirming the results of 10 consecutive seasons.

It is emphasized that the two new varieties, Northern Brewer and John Ford Hop, derived from a cross between Canterbury Golding and a male seedling of Brewer's Gold, have exceptional keeping qualities; it is considered probable that these varieties will gradually replace the Golding varieties Cobb's and Tutsham.

In brewing trials of certain new varieties which have exhibited resistance to *Verticillium* wilt, OJ47 and OR55, both tested for the first time, have given satisfactory results.

81. FLETCHER, L. 633.79:575(42.23)  
**Brewing trials with three new varieties of hops raised by Prof. E. S. Salmon, at Wye College, Kent; 1944 growths.**  
 J. Inst. Brew. 1945 : 51 : p. 232.

The data from brewing trials of the new varieties OM103, T8 and Wye Field Golding are summarized. All three varieties are highly satisfactory as brewing material.

#### CONDIMENTS 633.84

82. DESHPANDE, R. B. 633.842:575.11.061.1(54)  
**Inheritance of bunchy habit in chilli (*Capsicum annuum* L.)**  
 Indian J. Genet. Pl. Breed. 1944 : 4 : p. 54.

Normal plant habit has been found to be a simple dominant to the economically valuable "bunch" habit.

#### OIL PLANTS 633.85

83. VACHHANI, M. V. 633.854.74-2.8-1.521.6(54.7)  
**Phyllody of til in relation to date of sowing.**  
 Curr. Sci. 1945 : 14 : p. 238.

At Dokri, Sind, an experiment has been made with the new black-seeded variety of *Sesamum orientale* L., Jamesabad-33 and the white-seeded Cawnpore s-6; in the second year of the experiment the promising new variety Karho Johi was included. Four sowing dates were used. Early sowings were found to be conducive to the occurrence of phyllody. Jamesabad-33 showed considerable resistance to the disease and gave significantly higher yields than the other varieties.

84. **Sunflowers as oilseed crop.** 633.854.78.00.14(42)  
 Mon. Sci. News 1944 : No. 40 : p. 3.

Trials at the Imperial College have shown that by early sowing in late March several semi-dwarf varieties can produce ripe seed during August which also suffer a minimum loss from mould, and that with close spacing these varieties give very high yields. It is considered that sunflowers will become important as an oilseed crop in the drier parts of England if the tests in progress of suitable methods of harvesting are successful.

#### MEDICINAL PLANTS 633.88

85. MUKERJI, B. and 633.88  
 GHOSH, S. K.  
***Lobelia nicotianaefolia* Heyne as substitute for *Lobelia inflata* Linn., B.P.**  
 Curr. Sci. 1945 : 14 : 198-99.

*Lobelia nicotianaefolia* is recommended as a satisfactory substitute for *L. inflata*. The best method of collecting the plant and of preparing the tincture is described.

## RUBBER PLANTS 633.91

86. BANNAN, M. W. 633.913:576.356.5:581.04:581.45:581.46(71)  
**Tetraploid *Taraxacum kok-saghyz*. I. Characters of the leaves and inflorescences in the parental colchicine-induced generation.**  
 Canad. J. Res. 1945 : 23 : Sect. C : 131-43.

Seedlings at different stages of development were treated with colchicine. Most of the treated plants developed into chimaeras. By successive selection among the seedlings, plants were obtained with tetraploid or predominantly tetraploid crowns. It is possible that the majority of these plants had diploid roots; in view of this possibility and the fact that most of the colchicine treated seedlings became chimaeras, it is emphasized that the critical determination of the effects of tetraploidy should be made from second generation plants raised from polyploid seed. In general the plants with tetraploid crowns were no bigger than selected large-celled diploid plants which had also been treated with colchicine. The individual parts of the plants possessing tetraploid crowns tended to be greater in size but fewer in number than those of the diploid. A few of the plants with tetraploid crowns were self-fertile or apomictic early in the spring, but at a later date all the plants tested showed self-sterility. A general cross-fertility was observed among the tetraploid heads.

## FRUITS AND NUTS 634

87. 634: 581.162.5:581.036:578.08(42)

### A quick test for fertility.

Mon. Sci. News 1945 : No. 2 : 3-4.

Attention is drawn to the work carried out at the John Innes Horticultural Institution which has shown that all varieties of sweet cherry and many varieties of plums fall into incompatible groups according to a system of incompatibility genes. The use of the different effect of high temperature upon the growth of compatible and incompatible pollen tubes in the rapid determination of incompatibility relationships in orchard planting programmes and genetic experiments with fruit trees, is also briefly described.

88. ERIKSON, D. 634.2-2.3-1.521.6:581.8  
**Certain aspects of resistance of plum trees to bacterial canker. Part II. On the nature of the bacterial invasion of *Prunus* sp. by *Pseudomonas mors-prunorum* Wormald.**  
 Ann. Appl. Biol. 1945 : 32 : 112-17.

A detailed histological study has been made of the reaction in stems of the susceptible variety Giant Prune and the resistant variety Warwickshire Drooper to inoculations of *Pseudomonas Mors-prunorum*.

The variety Giant Prune exhibited greater injury due to cell-free filtrates of *Ps. Mors-prunorum* than Warwickshire Drooper.

89. WILLS, J. M. 634.57(94.3)  
**The Queensland nut.**

Qd Agric. J. 1945 : 60 : 342-51; 61 : 8-16.

A description is given of the indigenous edible nut tree, *Macadamia ternifolia*, the commercial cultivation of which is being extended, particularly in the coastal districts of southern Queensland. The nut has an oil content of 76%, in many respects equal in quality to high grade olive oil. The distinguishing characteristics of the four main commercial types of *M. ternifolia* are tabulated, and a description is given of the variety *integrifolia*.

90. HOFMEYR, J. D. J. 634.651:576.356.5:581.04  
**Further studies of tetraploidy in *Carica papaya*, L.**  
 S. Afr. J. Sci. 1945 : 41 : 225-30.

The present paper is a continuation of the work previously reported (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1290). Tetraploid seed has been found to be nearly twice the size and weight of diploid seed. The seed of the cross tetraploid x diploid weighs less than the diploid seed, and its endosperm fails to develop; the limited data on the reciprocal cross suggest that it is incompatible. Tetraploids are less fertile than the diploids, as indicated by seed counts. The quality of the fruit of tetraploids is equal to that of the diploids, is more compact and has a smaller seed cavity. According to the author's hypothesis presented in 1938 (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 654), gene *M*<sub>1</sub> determines maleness, *m* femaleness, and *M*<sub>2</sub> hermaphroditism, and the

genotypes of staminate, pistillate, and hermaphrodite flowers, are  $M_1m$ ,  $mm$  and  $M_1mm$ , respectively. Data from the tetraploid cross  $mmmm \times M_1M_1mm$  indicated random pairing of the chromosome bearing  $M_1$  and  $m$ . Two distinct types of staminate plants were identified in the progeny of this cross, presumably of the genotypes  $M_1M_1mm$  and  $M_1mmmm$ . The former type occasionally produces a few cucumber-shaped fruits from flowers which are usually 10-staminate and hermaphrodite; the later type produces a comparatively heavy fruit yield almost entirely from 5-staminate hermaphrodite flowers, the fruit being round to disc-shaped, similar to the pistillate type. Selfed  $M_1mmmm$  plants produce a progeny which fits a theoretical expectancy of 14 male flowers to 1 female, assuming that the genotype  $M_1M_1M_1M_1$  is lethal. Since the  $M_1mmmm$  staminate plants may be utilized both for their fruits and as a source of pollen, tetraploid plantings have a distinct advantage over diploid in this respect. Additional researches, however, are necessary before the tetraploid papaya can be recommended for commercial use.

91.

634.725:575.127.2:575(71.3)

**Thornless gooseberries.**

Gdnrs' Chron. 1945 : 118 : p. 125.

A note draws attention to work at the Central Experimental Farm, Ottawa, which aims at breeding a thornless gooseberry. A back-cross seedling of the hybrid between the thornless species, *Ribes oxyacanthoides*, and a commercial variety, was thornless and bore fruits of the commercial size, and was named Spinefree. It was, however, found to be a variable cropper, with somewhat small fruits. Spinefree was crossed with the large-fruited variety Clark. Thornless seedlings with fruits of commercial size have been produced from this cross and are designated 0-271, 0-274, and 0-275; they are under test in several parts of Canada.

92.

634.75-2.411.4-1.521.6:575(42)

**Breeding strawberries resistant to "red core" root rot.**

Mon. Sci. News 1945 : No. 5 : 3-4.

A brief description is given of the work of breeding varieties resistant to red core disease (*Phytophthora Fragariae* Hickman) in Scotland.

**FORESTRY 634.9**

93.

634.9:001.4(94)

**Nomenclature of Australian timbers. Pt III.**

Trade Circ. Coun. Sci. Industr. Res., Div. For. Products, Aust. 1940 : No. 47 : 45-82.

Common or local names and their corresponding standard trade and botanical names are listed.

94.

CHAMPION, H. G.

634.9:575(42)

**Genetics and forestry.**

Quart. J. For. 1945 : 39 : 74-81.

The full text is presented of the paper contributed to the symposium, the "Application of genetics to plant and animal breeding", held in London by the Genetical Society in 1944 (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1054).

95.

CHAMPION, H. G.

634.9:575.1(42)

**Genetics in forestry.**

Emp. For. J. 1945 : 24 : 12-13.

The practical application of the results of genetical research in forestry are briefly discussed, with reference to the possibilities of selection, the production of certified seed, polyploid and hybrid forms, and the vegetative propagation on a large scale of desirable individual trees.

96.

**Canada : tree breeding and propagation.**

News Bull. Emp. For. Departments 1942 : p. 39.

634.97:575(71)

Breeding work in progress at the Petawawa Forest Experiment Station, Canada, is briefly reported. Some  $F_2$  selections of Dunkeld Larch are superior to the  $F_1$  generation in growth and hardiness. Several new hybrid poplars, intended for use in shelter-belts in the prairies, are to be distributed for preliminary testing. Vernalization of stem-cuttings of hybrids between silver poplar and aspen, produced marked improvement in rooting capacity. Growth hormone treatment of root cuttings of the most important coniferous species and yellow birch resulted in successful rooting.

97.

ROBERTSON, W. M.

**Canada : silvicultural research.**

News Bull. Emp. For. Departments 1944 : 45-46.

634.97:575(71)

633.879:575.127.2:575(68)

Projects undertaken at the Petawawa Forest Experiment Station, Canada, include: (1) cytological work on colchicine-treated seedlings; (2) a propagation experiment on two varieties of *Betula papyrifera*, involving replicated rooting tests in various soils; (3) pollen germination tests in *Pinus*; (4) studies of resistance to blister rust in white pine; (5) an investigation of cross-pollination in spruce; (6) a survey in the Prairie provinces to study the requirements of strains and species suitable for shelter-belts; and (7) a search for strains of *Populus* resistant to *Septoria*. Clones of *Populus* have been obtained which exhibit resistance to frost and drought and also to rust and canker.

At the Alberta district and Kananaskis Forest Experiment Station progress has been made in developing *Populus* hybrids adapted to local conditions.

The results are given of the first year's genetical research on wattle in the Union of South Africa. Data have been obtained on seed weight, germination, seedling survival, and variation in seedling characteristics of black wattle (*Acacia mollissima*) and green wattle (*A. decurrens*). Selfed flowers of both species produced seed. Crosses were obtained between *A. mollissima* and *A. decurrens* and between *A. mollissima* and *A. dealbata*. Statistical analysis has shown that for trees of the same age and diameter significant variation exists in thickness of bark and chemical content.

### VEGETABLES 635

98.

**(Carrots of the Nantes variety from seeds grown in Palestine).**

Hassadeh 1945 : 25 : 265-67.

635.13-1.531.12(56.9)

The production of carrot seed has been found to be a difficult and unprofitable undertaking by members of the Seed Growers' Association. Trials have been carried out, however, to determine the quality of carrots produced from local seed in comparison with that of carrots from imported seed of the Nantes variety. The carrots from local seed showed a higher percentage of first-class roots and a more satisfactory colour, and matured earlier. By selection, the higher percentage of flowering plants in carrots from local seed is being reduced.

99. FEINBRUN, N.

635.26:582(56.9)

***Allium sectio Porrum* of Palestine and the neighbouring countries.**

Palest. J. Bot. 1943 : J. Ser. : 3 : 1-21.

A revision of the section *Porrum* of *Allium* occurring in Palestine, Syria and Iraq is presented.

100.

RAPHAEL, T. D.

635.34.00.14(94.6)

**Cabbage trials with notes on seed production.**

635.34-1.531.12(94.6)

Tasm. J. Agric. 1945 : 16 : 46-52.

Trials of twelve varieties comprising 20 lines are reported. Data are included of heart quality, the ratio of leaf to heart and plant size. Copenhagen Market gave the best all-round performance. Three methods of seed production are discussed.

101.

**(Cauliflower varieties and the new variety Early Beth Alpha).**

Hassadeh 1945 : 25 : p. 317.

635.35:575(56.9)

By selection, the variety Improved Japanese has been divided into two types, one very early and the other somewhat later maturing. The early type matures only a few days later than the variety Earliest of Mischmar Haemek; it has been named Early Beth Alpha, and seeds are available for commercial distribution.

102. LEVY, F.

635.35:575(56.9)

**(Cauliflower and the development of new varieties in Palestine).**

Hassadeh 1945 : 25 : 222-23.

In the winter garden region of the interior valleys a few years ago the market season lasted only a few weeks. By the cultivation of introduced and new varieties locally developed it is now possible to produce marketable heads for a period of almost six months, from the beginning of October to the end of March. These new varieties are: Earliest of Mischmar Haemek, Improved Japanese (first early), Glory of the Valley, Glory of Beth Alpha (early), Ben Schemen (medium), Metropol, and Medium Pearl.

103. STEARN, W. T. 635.64:576.16  
**Where did the tomato originate?**  
 Gdnrs' Chron. 1945 : 118 : p. 6, 18-19, 30-31.  
 The origin of the tomato is discussed with reference to the agricultural development of the Central South American peoples, the taxonomy of different species, the findings of the expedition of the United States Division of Plant Exploration and Introduction made in 1937 along the west coast of South America, and pottery relics. The view is accepted that the cherry tomato (*Lycopersicon esculentum* subsp. *Galeni*, = *L. cerasiforme*) is the type from which originated the large fruited furrowed tomato (*L. esculentum*, subsp. *typicum* var. *Colombianum*), the earliest cultivated type, and other garden types. The combined evidence is considered to point to coastal Peru as the original centre of cultivation of the tomato, among the Chimu and Nasca Indians whose culture lasted from about the ninth century A.D. to the fifteenth. A useful bibliography is provided.

104. POLLARD, A., 635.64:577.16(42)  
 KIESER, M. and  
 BRYAN, J. D.  
**Factors influencing the vitamin C content of tomatoes.**  
 Rep. Agric. Hort. Res. Sta., Long Ashton, Bristol 1944 : 171-79.  
 Among the factors influencing vitamin C content the effect of variety, as between Market King and Ailsa Craig, was determined. The fruit of Ailsa Craig had a higher vitamin C content than the fruit of Market King, under both out-of-doors and greenhouse conditions.

105. ABERDEEN, J. E. C. 635.64-2-1.521.6(94.3)  
**Diseases of the tomato and their control.**  
 Qd Agric. J. 1945 : 60 : 277-99.  
 Reference is made to varietal susceptibility or resistance to the different diseases.

106. S. ...., E. H. G. 635.655(73)  
**The development of the soya bean crop in the United States.**  
 Bull. Imp. Inst., Lond. 1945 : 43 : 88-93.  
 An account is included of the different types of soya bean cultivated in the United States, i.e. seed for grain and industrial purposes, forage, green vegetable and dry edible, and of the individual varieties grown in the various regions.

107. KUMAR, L. S. S. 635.659:576.356.5:581.04:575(54)  
**A comparative study of autotetraploid and diploid types in mung**  
*(Phaseolus radiatus* Linn.).  
 Proc. Indian Acad. Sci. 1945 : 21 : Sect. B : 266-68.  
 Various plant characters in colchicine-induced tetraploids and their diploid progenitor were compared in crops of two seasons. With the exception of the breadth and length of the petal and the breadth of pod and size of seed the characters of the tetraploid showed a percentage decrease in comparison with those of the diploid, a reduction in yield resulting. The tetraploid was also later in flowering and less resistant to disease. Similar results were observed in tetraploids of rahar, *Cajanus indicus* (cf. Abst. 108). It is therefore suggested that colchicine-induced autotetraploidy may not prove a suitable method of improving these pulse crops.

108. KUMAR, L. S. S., 635.659:576.356.5:581.04:576.354.4  
 ABRAHAM, A. and  
 SRINIVASAN, V. K.  
**Preliminary note on autotetraploidy in *Cajanus indicus* Spreng.**  
 Proc. Indian Acad. Sci. 1945: 21: Sect. B: 301-06.  
 Colchicine-induced tetraploids were compared in morphological and other characters. With the exception of leaf and flower size, the tetraploid characters showed an increase in comparison with the diploid. An investigation of meiosis in the tetraploid showed that the number of multivalents formed is fairly high, resulting in partial sterility.

109. VIRABHADRA RAO, J. 635.659:581.6  
**Chemical examination of *Erythrina indica* (white variety).**  
 Curr. Sci. 1945 : 14 : p. 198.  
 The properties of the oil extracted from the seeds of the white flowered variety of *Erythrina indica* have been analysed, and compared with the data obtained by other workers for oil extracted from the red flowered varieties. The oils from the two varieties are similar except in iodine and acid numbers. The two varieties were also found to contain the same alkaloid, hyaphaphorine.

## Part II. Foreign.

### \*STATISTICS 519

110. GRIES, G. A.,  
HORSFALL, J. G. and  
TURNER, N. 519.24

#### Polymodal response curves in biological research.

Phytopathology 1945 : 35 : 654-55. (Abst.).

The value of the polymodal curve in various biological researches is discussed.

111. GUMBEL, E. J. 519.24  
Ranges and midranges.

Ann. Math. Statist. 1944 : 15 : 414-22.

If the individuals from a sample of  $n$  are arranged in order of magnitude, the  $m^{\text{th}}$  range is defined as the difference between the  $m^{\text{th}}$  largest and  $m^{\text{th}}$  smallest, and the  $m^{\text{th}}$  midrange as the sum of the  $m^{\text{th}}$  largest and  $m^{\text{th}}$  smallest. For  $n$  large,  $m$  small compared with  $n$ , the  $m^{\text{th}}$  largest and smallest individuals are uncorrelated; and as  $n$  increases, the distribution of the  $m^{\text{th}}$  range and of the  $m^{\text{th}}$  midrange both tend to normality. Again, assuming no correlation, the moment generating function, moments and semi-variants are found in the case where the parent population is symmetrical and continuous.

S. N. C.

112. SCHEFFÉ, H. 519.24  
A note on the Behrens-Fisher test.

Ann. Math. Statist. 1944 : 15 : 430-34.

Given two samples, each from normal populations with unknown but equal variances, we may use Student's " $t$ " to test whether the population means are the same. This paper demonstrates that in the case when the population variances are not equal, there exist no symmetric linear and quadratic functions of the samples, the ratio of which is distributed as " $t$ " independently of the population parameters; for a demonstration that such asymmetric functions exist and form the basis of a valid test, the reader is referred to an earlier paper by the same author.

S. N. C.

113. WALD, A. 519.24  
On cumulative sums of random variables.

Ann. Math. Statist. 1944 : 15 : 283-96.

Until recently, in the theory and practice of sampling, it was usual to take a pre-assigned number  $N$  of individuals, to calculate a certain statistic from these  $N$  observations, and to compare this statistic with some suitable tabulated function. There is now a growing tendency to take the individuals in the sample one by one, the sampling stopping when the running statistic satisfies a certain inequality. This paper is devoted to one particular running statistic, namely the sum of the observations in a sample of size  $j$ .

Thus, if  $z_i$  is the random variable, and  $Z_j$  is the partial sum to  $j$  term, then  $Z_j = \sum_{i=1}^j z_i$ .

Now let  $a$  be any positive number, and  $b$  any negative number. There will, in any practical case, be a least  $n$  such that the partial sum  $Z_n$  to  $n$  terms does not lie between the values  $a, b$ ; then  $n$  itself is a random variable, and will have a distribution. It is shown that the probability that  $n$  is finite is unity.

Some properties of the distribution  $n$  are discussed, provided that the mean of  $z$  exists and the variance of  $z$  is finite. Finally, the distribution of  $n$  is found for general values of  $a, b$ ; but the formulae are very heavy, even in the case where  $z$  is distributed normally. It is possible, without discussing the distribution directly, to obtain limits for the probability that  $Z_n$  is greater than  $a$ , or less than  $b$ .

S. N. C.

114. SIMPSON, G. G. 519.271.3  
Note on graphic biometric comparison of samples.

Amer. Nat. 1945 : 79 : 95-96.

In reply to a criticism by Hubbs and Perlmutter (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 100) the author defends the validity of the Dice-Leraas method of comparing samples of biological populations.

\* General studies, see also individual crops.

115. KARTMAN, L.

575(47)

**Soviet genetics and the "autonomy of science".**

Sci. Mon., N.Y. 1945 : 67-70.

The author deprecates Polanyi's criticisms of the state of genetical research in the U.S.S.R. While believing that Lysenko represents a form of extremism in his breakaway from Mendelian genetics, it is thought that the research done by other geneticists in Russia is ample evidence for the flourishing state of genetics there.

116. Coïc, Y.

575:577.1

**Hérédité des caractères biochimiques chez les végétaux. (The inheritance of biochemical characters in plants).**

Ann. Agron., Paris, 1942 : 12 : 361-90.

The importance of the inheritance of biochemical characters is stressed and it is pointed out that as well as morphological characters they help in the classification of plants.

The genetical behaviour of biochemical characters is reviewed and illustrated by examples taken almost entirely from the French literature. R. M. I.

117. CRÉPIN, C.

575.633(44)

**Rapport sommaire sur les travaux poursuivis en 1941 par les stations d'amélioration des plantes. (Condensed report on the work carried on in 1941 by the plant breeding stations).**

Ann. Agron., Paris 1942 : 12 : 633-69.

**Wheat**

The pubescence of the sheaths of the third and fourth leaves and the behaviour of the last leaf at the time of earing are characters constant enough for use in varietal description. The relation of the number of tillers to the number of ears per plant was studied in a number of varieties of different tillering capacity. Yield trials and trials of varieties and hybrids resistant to bunt and cold are recorded.

A new hybrid, Closeaux, from the cross Vilmorin 23 x Garnet has surpassed other alternative spring-sown wheats in yield and is to be put on the market in 1942.

At Clermont-Ferrand, varietal tests showed several satisfactory lines.

**Oats**

Lines from the American varieties Bicknell and Hairy Culberson and from the cross Z 45-94 x Prieuré have shown a slight but definite improvement in resistance to cold in comparison with the best lines usually grown.

**Barley**

Variety tests were made on a number of lines.

**Potato**

Two German clones from the cross *S. demissum* x *S. tuberosum*, three clones from a single back-cross and one from a double back-cross [(*S. demissum* x *S. tuberosum*) x *S. tuberosum*] x *S. tuberosum* showed considerable resistance to attack by the Colorado beetle.

Varietal and cultural tests were also made on flax, colza, poppy, sunflowers, soya beans and tomatoes.

Studies made on  $F_2$ ,  $F_3$  and  $F_4$  lines of tetraploid mutants obtained by colchicine treatment in 1938-40 from various types of plants in comparison with the diploids showed marked morphological modifications. It has been found that phenylurethane can replace colchicine, but the number of mutants obtained is less.

Two new wheats, Hybride de la Tour and Soissonnais, and two new oats, Jaune d'Arlois (yellow grain) and Trophée-Vilmorin (white grain), have been accepted for inclusion in the catalogue of species and varieties. R. M. I.

118.

575:633(47)

**(Collated plan of research for 1943 at the Institute of Grain Husbandry of the South-Eastern U.S.S.R. and its subsidiary stations).**

Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1943 : No. 1 : 5-20.

The Journal of the Institute having ceased publication, the present bulletin is the first of a series to take its place. Each of the 32 sections, into which the whole bulletin is divided, representing

\* General studies, see also individual crops.

a distinct aspect of agricultural research, contains very bare references to the work connected with it which is being, or is to be, carried out at the Institute and its subsidiary stations. There are numerous references among the sections to the breeding of various useful plants and *Agropyron* hybrids.

I. Z.

119.

**(A short account of the research work done during 1944 at the Institute of Grain Husbandry S.E. U.S.S.R. of the Order of the Red Labour Banner).**

Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 4 : 3-18.

Wheat varieties of the Lutescens, Albidum, Milturum, Erythrospermum and Hostianum types have been produced, the yields of which have, on trial, exceeded those of standard varieties adopted by various districts. They include 17 varieties of spring and three of winter wheat. One variety of rye, Volžanka No. 7, still undergoing trials, has been produced. Reference is made to supplementary pollination by artificial means, the practice of which has resulted in augmenting the yield by 1 to 3.5 centners per ha.

The breeding of millet continues, and one promising new variety has appeared, the vegetative period of which has been prolonged; by thus extending the harvesting period, the loss of seed which accompanies it can be reduced.

The yield of seeds and their content of oil are being increased in the sunflowers, three varieties of which have been bred.

Perennial wheat varieties, resulting from the hybridization of wheat and *Agropyron* spp., have also been bred.

I. Z.

120.

575:633(48.5)

Årsberättelse för 1944 avgiven den 28 januari 1945. (Annual report for 1944 issued 28 January 1945).

K. LantbrAkad. Tidskr. 1945 : 84 : 11-34.

This is a report by the Swedish Academy of Agriculture.

Research on the best means of extending cultivation of oil and textile plants in Sweden includes studies of the suitability of various localities for such crops, the aim being if possible to encourage production over southern and central Sweden. The development of oil crop cultivation will depend on the production of new varieties and strains specially suitable to the requirements of the country. Intensive breeding of oil crops has been started at Svalöf and some new varieties have already been produced.

Hugo Winkler has been directing research on sweet lupin problems, while Olaf Tedin and A. Josefsson in Svalöf are engaged in breeding experiments including the production of a type that is satisfactory as regards seed yield.

No definite evidence on the possibility of growing *Taraxacum* in Sweden has yet been obtained but work on kok-saghyz has been in progress for some years.

Though the Swedish Academy of Agriculture was unable to carry out clover research, local trials of strains have been organized, and the Swedish Seed Growers' Association (Sveriges Fröodlarförbund) is also concerning itself in this work.

Outstanding work has been achieved in the production of new winter-hardy types of wheat, barley and oats, e.g. the Edda barley and the Same oat (cf. *Plant Breeding Abstracts*, Vol. XIII, Absts 849 and 496) for which an increased yield of 10% is claimed.

Research on plant protection has included work on methods of identifying viruses by serum diagnosis.

Grants were made by the Academy in aid of research on blue lucerne seed production, quality in peas, trials of alsike clover and red clover, as well as physiological studies and yield experiments with polyploid crop plants, especially barley.

In connexion with re-organization of the work of the Academy, new statutes received the Royal assent in December, 1944.

121. LIN, CHENG YAO

575:633(51)

(Report of the Agricultural Experiment Station of Fukien University).

Fukien Agric. J. 1940 : 2 : 239-42.

A brief report is presented of the work of the various departments of the station. Breeding work is mainly on crop plants. About 1500 varieties of rice are being studied.

T. C. Y.

## Rapport annuel pour l'exercice 1939. (Annual report for the year 1939).

Publ. Inst. Agron. Congo Belge 1941 : Hors Sér. : Pp. 305.

The sixth annual report is presented of the work of the various departments, experimental stations and plantations. In addition to the breeding work summarized below, yield trials and the introduction of new varieties of many tropical crops are described, and mention is made of mass selection and pedigree selection, at the different stations, of wheat, sorghum, *Eleusine*, cassava, groundnut, beans and pyrethrum, and of selection of mother trees in *Hevea* and oil palm, and of tea bushes.

The main work of the genetics department has consisted of investigations on the physiology of the oil palm. A department of physiology has been established, whose activity will include researches which have hitherto devolved upon the genetics and other departments. A new experimental station has been founded at Gimbi, north of Matadi, for the study of fibre plants.

**Maize**

Strains have been obtained at Gandajika which show improvement in several plant characters, and yield 28.7% more than the unimproved local variety. In selecting inbred lines to produce hybrids, it has been observed that, in general, selfing depresses yield but has little marked effect on vegetative vigour. Promising hybrids between inbred lines have been obtained. Intervarietal crosses have been mostly between the improved variety Gandajika and several introduced varieties.

**Rice**

At Yangambi, crosses have been carried out between Monzano and three varieties from Ceylon, with the object of developing lines with improved resistance to lodging and more suitable vegetative cycles.

**Fibre plants**

Investigations at Gimbi have been mainly on *Urena lobata*. Mass and pedigree selection are in progress.

**Cotton**

The chief aim of selection work at Ruzizi is the production of a suitable variety to replace the long-stapled cotton Allen. The variety Lubarika is considered promising and has been distributed on a large scale. This variety has a shorter fibre than Allen but a higher ginning percentage. Pedigree selections of Triumph, U.4 and hybrid U.4 at the Gandajika station have shown freedom from *Lygus* attack, and an increased fibre length in comparison with mass selections of the same varieties. Natural hybrids of Ishan with a number of other varieties are under observation; controlled hybridization between this variety and Triumph and U.4 has been effected.

At Bambesa the lines 145.C.55 and 270.D.64 show particular promise. Selections of Farm Relief have satisfactory fibre length but are inferior in yield to the Bambesa strains; this variety has been used in hybridization work. From a selection of Ishan two distinct groups of lines have been produced.  $F_6$  lines of Triumph Big Boll x Acala have shown high yields and ginning percentage, and also satisfactory fibre length.  $F_2$  hybrids of Triumph selections crossed with Lightning Express, Farm Relief and S.G.29, are under observation.

At Yangambi indication has been obtained of a positive correlation between resistance to *Dysdercus* and the thickness of the inner wall of the capsule. Selection for resistance to wilt (*Fusarium vasinfectum* and *Verticillium Dahliae*) and stigmatomycosis is in progress.

**Coffee**

At several stations selection of mother trees and their progeny is reported. At the Mulungu-Tschibinda station considerable intervarietal and intravarietal differences of an heritable nature have been found with regard to cherry yield, tree habit, size and shape of leaves, and disease resistance.  $F_1$  hybrids from cross-pollinations among *Coffea arabica* types have exhibited a superiority in productivity and bean size in comparison with selfed trees. Satisfactory seed yields have been secured from crosses between *C. arabica* and *C. liberica* types. Yield data of *C. arabica* trees over a period of six years have given no indication of a biennial periodicity. Studies have been made of the variability in yield, the correlations between annual and total yields of individual trees, and of analysis of the yielding capacity of the different categories of trees in a given population. It was found that the data of one year's yield do not provide an adequate basis for the selection of élite trees. Correlations were obtained between the mean yields of the second, third and fourth years, and total yield.

At Yangambi natural interspecific and intraspecific crossing is reported. Selfings have been carried out with a success of 1·6-18·8%.

No lines have shown immunity to anthracnose (*Colletotrichum coffeaeum*) at Mulungu-Tschibinda, but several exhibit a sufficient degree of resistance. Studies on resistance to the "hot and cold" condition are in progress at the Nioka station. No completely resistant line has been observed, but the percentage of injured plants varies considerably among the different lines. The possible commercial value of *Coffea eugenioides*, from Ituri, is also being studied.

#### Cacao

Selection of mother trees of Forastero and Criollo x Forastero has been continued at Yangambi. A considerable number of artificial selfings and crossings involving Criollo x Forastero hybrids and Forastero have been carried out.

#### Cinchona

At Mulungu-Tschibinda selection of mother trees has been continued. Hybrids obtained include crosses between *C. Ledgeriana* and *C. succirubra*.

#### Banana

Indigenous bananas have been interplanted with seven different seed-bearing species with a view to obtaining hybrid seed; artificial hybridizations have been made between indigenous bananas and *Musa acuminata*, *M. rosacea*, *M. mindanensis* and *M. Martini*, between the edible banana and *M. acuminata*, and between *M. rosacea* and *M. acuminata*.

123.

575:633(74.5)

#### Fifty-seventh Annual Report Rhode Island State College Agricultural Experiment Station 1945 : Contr. 674 : Pp. 39.

#### Bent grass

The study of the relationship between chromosome numbers and morphological characteristics in *Agrostis tenuis* was continued, and the results obtained have confirmed preliminary work. Chromosome numbers are very variable, ranging from 30 to 40. No correlation was found between chromosome number and plant morphology. Plants which taxonomically appear to be definite types show evidence of a hybrid nature on the basis of their chromosome number.

#### Vegetables

The analysis of carotene and vitamin C contents of varieties of vegetables was continued. The crops consisted of cabbage, lettuce, summer and winter squashes, pumpkins, tomatoes and snap beans.

124.

575:633(76.1)

#### Fiftieth annual report of the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, January 1 to December 31, 1939. Pp. 43.

#### Vetch

Specific and varietal differences in aphid resistance have been determined. Two common vetches, Nos 16462 and 29935, showed resistance, as did also *V. villosa*, *V. angustifolia*, *V. melanops* and *V. hybrida*. Nos 18134, 18005 and 71116 (*V. sativa*) showed intermediate resistance. The stem tips, flowers and young pods of even the resistant plants were injured by aphids.

#### Cotton

Many promising selections are under test. A new strain of the wilt resistant variety Cook, No. 1347, is to be distributed. It is a high yielding, rapidly fruiting cotton with a staple length of approximately 15/16 inch.

#### Soya bean

Varieties have been classified on the basis of reaction to virus disease. A few inbred selections have shown markedly greater resistance than the parent lines.

125.

575:633(76.1)

#### Fifty-first annual report of the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, January 1 to December 31, 1940. Pp. 45.

#### Cotton

Wilt resistant strains of Deltapine have been isolated. Strains of Stoneville 2B and 5A have been developed, superior to the parent varieties in yield and percentage of lint.

**Cabbage**

Varieties of cabbage and collard have been classified on the basis of cold resistance.

**Beans**

In a comparative test of strains of pole snap beans and several commercial varieties, Alabama 25 and Alabama 1 gave higher yields than Kentucky Wonder, and Alabama 18 equalled this commercial variety. Alabama 18 and 1 are highly resistant to root knot. Alabama 18 is a particularly valuable parent in breeding, since it possesses the linked characters of green pods and root-knot resistance.

**Peas**

Observations have been made on the hardiness of several varieties of English peas.

126.

575:633(76.1)

**Fifty-second annual report of the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, January 1 to December 31, 1941.** Pp. 32.

**Cotton**

A strain of Cook 144, designated Cook 144-7 (Auburn), has been selected, superior to the parent strain in yield, staple length and wilt resistance.

**Pecan**

Selection work is in progress.

127.

575:633(76.1)

**Fifty-third annual report of the Agricultural Experiment Station of the Alabama Polytechnic Institute, Auburn, January 1 to December 31, 1942.** Pp. 30.

**Cotton**

Selection work to improve Cook 144, Stoneville, Deltapine and Miller 610 was continued. The two new strains, wilt resistant Deltapine 11A-192 and wilt susceptible Stoneville 2B-870, have given promising results. A new high yielding strain of Deltapine, No. 189, has been developed, which has a medium-sized boll and light foliage.

128.

BURR, W. W.

575:633(78.2)

**Nebraska agriculture.**

58th Rep. Neb. Agric. Exp. Sta. 1944 : Pp. 124.

**Wheat**

The new winter variety Pawnee, recommended for south-eastern Nebraska, is early, resistant to hessian fly and loose smut, and moderately resistant to leaf and stem rust, with satisfactory milling and baking qualities. Several new selections from the cross Nebraska No. 60 x (Mediterranean x Hope) have shown good yields and promising resistance to leaf and stem rust. In tests of spring wheats the hybrid Merit x Pilot (C.I. 12315) gave the highest yield.

**Maize**

An evaluation of the combining ability of 135 inbred lines was made by top-crossing them to two single crosses as testers. Single crosses have been tested to obtain data for the prediction of double-cross performance, particular attention being given to new material for the north-eastern and western regions of Nebraska and to white hybrids.

Progress is reported in the programme of developing new waxy hybrids for industrial use.

**Sorghum**

In the programme of breeding for chinch bug resistance, new selections of the combine type have shown promise, giving yields equal to or higher than those of Early Kalo. The work of imparting smut resistance to the commercial varieties has been begun.

**Sudan grass**

Attention is being given to the problem of developing improved strains resistant to chinch bug and with low prussic acid content.

**Lucerne**

Plant selection for superior seed productivity in the variety Ranger and a study of the role of insects in pollination are being carried out to solve the problem of obtaining increased seed production.

Work in connexion with the utilization of hybrid vigour in hybrid or synthetic combinations has been continued.

### **Sweet clover**

Work of improvement is in progress with regard to the following: yield, lateness of maturity, fineness of stem, leafiness, palatability, coumarin content, and seed production.

Selections have been obtained from the  $F_2$  of the cross between Madrid and Rasmussen Late Yellow, combining the high yield of the first named parent and the lateness of the latter. The character of late maturity was found to be a simple Mendelian recessive.

### **Potato**

The search for lines with bright red skin colour continues. Several high yielding medium to early lines producing red tubers are being increased for commercial trial, one of which exhibits some scab resistance.

Differences in ascorbic acid content to the extent of 30% were found among tubers of different varieties.

Among selected seedlings five promising types showed scab resistance, three of which also showed resistance to *Fusarium* wilt.

An investigation was made of varietal resistance to the potato leaf hopper and hopper-burn damage and to the potato flea beetle in 12 varieties and selections.

### **Castor bean**

Promising results have been obtained in the work of selecting short, fine-stemmed, non-shattering and early maturing strains, suitable for combine harvesting.

### **Safflower**

Extensive breeding work is in progress. Existing varieties are being selected to improve their purity. Tests of 20 varieties have indicated that the following offer the most promising sources of breeding material: the Turkestan type Special Russian, and the Indian types Pusa 1, 2, 7 and 25, Simla, Asmednager 1, and Sholapur 1. Investigations are being made to determine the percentage of cross-pollinations, the inheritance of flower colour, sterility and spininess, and the relationship between oil content and other plant characters. The breeding programme has as its objectives the selecting of strains with an oil content of 34%, the production of strains remaining in the rosette stage of growth for only a brief period and thus providing better competition against weeds, and the breeding of varieties combining high oil content and absence of spines. Other characters under consideration include maturity, seed size, diameter of the seed heads, and resistance to shattering and lodging.

### **Tomato**

The new varieties, Sioux and Red Cloud, were named and released for commercial distribution. Red Cloud requires somewhat specific cultural conditions. Sioux has a relatively high ascorbic acid content.

The various factors influencing ascorbic acid content have been investigated, such as variety, fruit size, stage of growth of plants and locality.

### **Beans**

Crosses were made between commercial varieties susceptible to halo blight and four resistant varieties. Selection under field and greenhouse conditions for resistance to halo and common blight was continued.

A new variety of Pinto field bean, derived from the cross Great Northern x Common Pinto, has been named Scottsbluff Pinto. It is early and vigorous, giving high yields of good quality, although it is not markedly disease resistant.

### **Soya bean**

Hybridization and selection were continued with the object of producing varieties better adapted to the soil and climatic conditions of Nebraska. In a yield test of 450 single plant selections, a number out-yielded the commercial varieties.

### **Popcorn**

Hybrids have shown yields 39-69% higher than those of open-pollinated varieties, with a superiority of 30% in popping expansion. The work of developing new inbred lines from the open-pollinated varieties of Nebraska has been begun.

129. HENNEY, H. J. 575:633(78.8)  
**Director's Annual Report of the Colorado Agricultural Experiment Station for the fifty-fifth fiscal year 1941-42.**  
 Fort Collins 1942 : Pp. 59.

**Barley**

A study is in progress on the location of various genes. New varieties are being developed. The response of a large number of hybrids to inoculations of smut is under observation.

**Sudan grass**

Inbreeding has caused loss of vigour in some strains, but further loss rarely occurred after the second selfing. Several promising vigorous inbreds have been obtained.

**Lucerne**

A determination has been made of the plot size and spacing most satisfactory in testing strains. Air-dry weights of hay were found to be a more accurate basis for estimating comparative yields than green weights.

**Potato**

Out of a number of strains tested No. 891 has shown the most promising resistance to psyllid yellows.

**Peach**

Different varieties have responded differently to small amounts of calcium chloride added to the syrup to increase firmness of flesh in the canned product.

**Onion**

Hybrid strains are to be tested for thrips resistance. Progress is reported in the development of hybrids resistant to purple blotch.

130. 575:633(79.1)  
**Fifty-third annual report for the year ending June 30, 1942, of the Agricultural Experiment Station, University of Arizona, Tucson. 1943 : Pp. 93.**

**Barley**

Preliminary selection for grain and forage yields and resistance to lodging in the progeny of the cross Vaughn x Scarab has given promising results.

**Sorghum**

Selection in hegari, Manko, Atlas and Fargo was continued.

**Cotton**

The Stoneville and Santan Acala Upland cottons are being selected with the object of improving the length and strength of the fibre.

In the work of breeding long staple cottons, data have been obtained from the  $F_1$  and  $F_2$  of the cross Pima x 120 and from the  $F_1$  of Pima x 120 back-crossed to Pima, indicating that lint abundance is an inherited character depending upon a relatively small number of genes. Some selected  $F_2$  plants combined a lint fineness equal to that of Pima and a lint index equal to that of strain 120.

**Guayule**

Second-year seedlings have exhibited immunity to *Sclerotium Roflsii*, resistance or immunity to *Phymatotrichum omnivorum*, and resistance to *Heterodora marioni*.

**Pecan**

An analysis of thiamin and riboflavin contents has been made in the varieties Western Mesa, Mahan, Halbert and Humble. In general, the pecan was found to be a good source of thiamin but a relatively unsatisfactory source of riboflavin. The variety Halbert, however, had a fairly high riboflavin content but was lower in thiamin content than the other varieties.

**Water-melon**

In a test of varietal reaction to *Fusarium* wilt, commercial strains of Klondike R7 varied widely in degree of resistance. The standard Klondike exhibited the greatest susceptibility.

**Soya bean**

Several relatively non-shattering strains have been selected.

131.

575:633(79.1)

Fifty-fourth annual report for the year ending June 30, 1943 of the Agricultural Experiment Station, University of Arizona, Tucson. 1944 : Pp. 95.

### Wheat

Selections from double crosses have equalled the variety Baart in yield but have shown a lack of uniformity in straw strength. Further selection is in progress for uniformly strong straw. An attempt is being made to combine the factors for rust resistance of Hope and *Triticum Timopheevi* with Baart 38 in a third back-cross strain.

### Lucerne

Selections Nos 19316 and 84409 have shown promising resistance to bacterial wilt and desirable growth characteristics.

### Cotton

Selection of New Mexico 1517, Santan Acala, Stoneville 4A and 2B is in progress.  $F_2$  plants of the following crosses are under observation: Santan x New Mexico 1517, Santan x Stoneville 2B, Santan x Wilds No. 13, 1517 x Stoneville 2B, 1517 x Wilds No. 13, Stoneville 2B x Wilds No. 13 and D and PL12 x Wilds No. 13; back-crosses and selections of the parent varieties are also being grown. Four of the parent varieties have been analysed for various aspects of quality. In hybrids involving Santan the  $F_2$  plants showed good standing ability, particularly in back-crosses to Santan as the recurring parent. In back-crosses in which 1517 and Stoneville 2B were the recurring parents, the progeny had poor standing ability.

In the programme of breeding long-staple cotton,  $F_3$  progenies of the second back-cross of Pima x Tangüis to Pima, have been studied chiefly with respect to the qualities of the lint and seed weight, with the object of combining the length and fineness of fibre of Pima and the high lint abundance of Tangüis. The data suggest that if the finest cottons are to be produced with the desired seed weight, a lint percentage somewhat lower than that obtained from the coarse cottons must be expected. Progenies with strong fibre occur in both the fine and coarser fibred types.  $F_4$  progenies are being grown for further selection and data of lint quality.

Tests have shown that strength of fibre of the individual seed decreases as the length decreases.

### Lettuce

The recently developed varieties Arizona 615 and 152 have shown promise in trials by growers. Arizona 152 in particular has given satisfactory results with regard to uniformity, vigour, resistance to bolting, and other desirable characters. Selection and inbreeding of hybrid lines has been continued. The promising strains, 3-4-43 and 0-29-43, have been produced from the cross Arizona 615 x 152. Strain 24-43 from U.S. hybrid 41068 shows potentiality as an early variety.

### Cantaloupe

Arizona 13 is a new variety selected from a cross between Imperial 45 and A2, a commercial selection of Superfecto, combining the edible quality of Superfecto and the character of firm flesh of Imperial 45.

### Soya bean

The non-shattering variety Armredo has exhibited high resistance to *Heterodora marioni* in field and limited greenhouse tests.

132.

LJUNG, E. W.

575:633:007(48.5)

Per Artur Olsson. (Per Artur Olsson).

Sverig. Utsädesfören. Tidskr. 1945 : 55 : 160-63.

An obituary notice is presented of P. A. Olsson, whose work on root crops will be specially remembered by plant breeders.

### \*GENETICS 575.1

133.

ERNST-SCHWARZENBACH, M.

575.1:576.12

Genetik und Evolution. (Genetics and evolution).

Vjschr. Naturf. Ges. Zürich 1940 : 85 : 35-50.

The historical development of evolutionary and genetic theory forms the subject of this academic dissertation submitted to Zürich University. The role of selection, adaptation, mutation and numerous other factors in evolution is examined from a broad biological standpoint. A bibliography is given.

\* General studies, see also individual crops.

134. POULSON, D. F. 575.113.7  
**Genes as physiological agents. Chromosomal control of embryogenesis in *Drosophila*.**  
 Amer. Nat. 1945 : 79 : 340-63.  
 An analysis has been made of lethal deficiencies in *Drosophila*, which are shown to bring about aberrations during various stages of the individual ontogeny.

135. RICHEY, F. D. 575.125  
**Bruce's explanation of hybrid vigor.**  
 J. Hered. 1945 : 36 : 243-44.  
 Attention is drawn to the Mendelian explanation of hybrid vigour presented in a paper by Bruce in 1910, and the original paper is reproduced. In the writer's opinion, Bruce's paper merits recognition as the first comprehensive hypothesis explaining hybrid vigour as the interaction of dominant genes. It is thought that the two main objections to such a hypothesis, viz., the lack of skewness in the  $F_2$  and non-recovery of the multiple homozygous dominant, have since been shown to be invalid by the work of Collins in 1921, that Bruce's theory is of general application, and that his formulae apply equally to the decrease in vigour upon selfing and the increase in vigour upon hybridization.

136. GOLDSCHMIDT, R. B. 575.17  
**One- or two-dimensional action of mutant loci ?**  
 Amer. Nat. 1945 : 79 : 97-103.  
 An analysis is made of the *Drosophila* data presented by Stern and Schaeffer (cf. *Plant Breeding Abstracts*, Vol. XIV, Absts 449 and 775). It is concluded that, in contrast to Stern's own interpretation, the varying effects of the cubitus interruptus gene (*ci*) can be explained more satisfactorily by postulating simple genic action than by the assumption that *ci* exerts two opposite effects.

137. WRIGHT, S. 575.17  
**Genes as physiological agents. General consideration.**  
 Amer. Nat. 1945 : 79 : 289-303.  
 A useful review is given of present theories relating to the nature of the gene. The power of self-duplication is emphasized and it is thought improbable that it is to be accounted for by a succession of step syntheses; the alternative notion that the gene acts as a model on which further genic material is constructed is mentioned, and applied also to the problems of protein synthesis and cytoplasmic heredity. These ideas are considered in relation to the point of view which regards the organism as a whole as a self-regulatory system.

138. SCHMUCK, A. 575.17:581.165.71:577.17  
**(Biochemical changes of grafted plants and plant transplantation as a method to pose and solve physiological and biochemical problems).**  
 Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. U.S.S.R.) 1945 : Nos 1-2 : 3-13.  
 The present paper deals with the evidence bearing on the relations between scion and stock and, incidentally, its repercussions on genetic science. The work done on grafting with various economic plants, e.g. potato, tobacco, *Datura* and tomato, is discussed from the standpoint of metabolism and in particular the synthesis of various alkaloids and other substances in the grafts. The function of the root in metabolism receives special attention. Some of the results in the field are conveniently tabulated.  
 The theory of "hormone-genes" is mentioned as an inadequate explanation of scion-stock interaction in transplantation experiments, especially in view of the author's opinion that the actual existence of genes is very doubtful and that the work done on grafting supports this view.

139. SONNEBORN, T. M. 575.182:575.17  
**Genes as physiological agents. The dependence of the physiological action of a gene on a primer and the relation of a primer to gene.**  
 Amer. Nat. 1945 : 79 : 318-39.  
 The  $\kappa$  cytoplasmic factor of *Paramecium aurelia*, which determines the killer reaction, has been shown to depend for its effect on the quantity in which it is present. It also appears to become inactive when present in the macronucleus instead of the cytoplasm.

## VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

140. FRIEDBERG, L. 575.2:575.1  
 Notions comparées de fluctuation et de variation dans l'amélioration des plantes. (**Comparative ideas on fluctuation and variation in plant breeding**).  
 Ann. Agron., Paris 1942 : 12 : 391-420.  
 In this lecture fluctuation and variation, as exemplified in a pure line, are discussed for various plants under different genetical conditions.  
 It is of the greatest importance in the study of evolution and in the practical science of plant breeding that variation and fluctuation should be clearly distinguished. R. M. I.

141. PALMA, S. E. 575.255:575.  
 Estudio de algunas quimeras vegetales. (**Study of some plant chimaeras**).  
 An. Inst. Fitotéc. Santa Catalina 1942 : 4 : 75-103.  
 Chimerical variegation has been studied in representatives of the three genera *Ligustrum*, *Citrus* and *Dianthus*. In the first case, leaf variegation is ascribed to the variability of the plastids, in the second, to the existence of two genetically different tissues arranged to form a periclinal chimaera, and in the third, to the presence of mutable genes determining petal pigmentation.

142. GAUSE, G. F. and 575.3:575.24  
 ALPATOV, W. W.  
**On the inverse relation between inherent and acquired properties of organisms.**  
 Amer. Nat. 1945 : 79 : 478-80.  
 Zoological examples are quoted to support the hypothesis that a relationship of inverse proportionality exists between the power of an organism to respond adaptively to its environment and its capacity to undergo adaptive mutation.

143. MCATEE, W. L. 575.41  
**The mechanism of heredity in relation to the theory of natural selection.**  
 Ohio J. Sci. 1943 : 43 : 117-20.  
 The theory of natural selection is critically reviewed. The conclusion is reached that natural selection, if operative at all, must act through the medium of the soma, and thus cannot directly influence the germ plasm which is regarded as essentially independent from the soma and upon which the continuity of the race depends.

**ORIGIN OF SPECIES 576.1**

144. MAYR, E. 576.12  
**Symposium on age of the distribution pattern of the gene arrangements in *Drosophila pseudoobscura*. Some evidence in favour of a recent date.**  
 Lloydia, Cincinnati 1945 : 8 : 70-83.  
 The evidence produced by Epling in support of an ancient (Miocene or earlier) origin for the gene patterns of *D. pseudoobscura* is criticized. It is pointed out (1) that analogies between *Drosophila* and slowly evolving organisms are not cogent in the light of present knowledge concerning rapidly evolving forms; (2) that Epling's arguments on the selective value of gene arrangements may be otherwise interpreted; (3) that the implication of slow dispersal of *Drosophila* may not be valid; and (4) that the assumption of climatic stability in Central America is open to question.

145. SIMPSON, G. G. 576.12  
**Symposium on age of the distribution pattern of the gene arrangements in *Drosophila pseudoobscura*. Evidence from fossils and from the application of evolutionary rate distributions.**  
 Lloydia, Cincinnati 1945 : 8 : 103-08.  
 The need for suspended judgment on the problem of the evolutionary age of *D. pseudoobscura* is emphasized. Inadequacy of facts prevents a legitimate deduction from being drawn at the moment, and the various indirect estimates proposed, based on geographical distribution and the assumption of bradytely, are shown to lack cogency.

146. STEBBINS, G. L. (jun.) 576.12  
**Symposium on the age of the distribution pattern of the gene arrangements in *Drosophila pseudoobscura*. Evidence for abnormally slow rates of evolution, with particular reference to the higher plants and the genus *Drosophila*.**  
*Lloydia*, Cincinnati 1945 : 8 : 84-102.

The botanical evidence for the occurrence of bradytelic (extremely slowly evolving) phylogeny is assembled. *D. pseudoobscura* is believed to exhibit the characteristic traits of a bradytelic species, and it is believed that an assumption of recent dispersal is inadequately supported. Data from palaeobotany are thought to confirm the theory of the persistent existence of barriers to migration between the Californian and central Mexican *Drosophila* habitats.

147. WIDMARK, E. M. P. 576.12:577  
**The theory of evolution from a biochemical point of view.**  
*Hereditas*, Lund 1945 : 31 : 383-90.

A discussion is given of the question whether biochemical evolution can be traced in the comparative study of organisms, parallel to a reconstruction of evolution based upon morphological observations. The author finds no evidence from general biochemical data to support the concept of evolution in a phylogenetic sense.

148. HOROWITZ, N. H. 576.12:581.192:575.24  
**On the evolution of biochemical syntheses.**  
*Proc. Nat. Acad. Sci. Wash.* 1945 : 31 : 153-57.

It is suggested that the first living entities were heterotrophes subsisting on complex organic molecules present in their environment. Depletion of any essential substance would then confer a selective advantage on any individual which was able to synthesize the required substance through the action of an enzyme produced by the activity of a mutant gene. If, then, the new starting point of the synthesis considered became depleted, natural selection would favour a mutant enabling a two-step synthesis to occur and so on. In this way, the evolution of chain syntheses might be accounted for.

### \*CYTOLOGY 576.3

149. HINTON, T. 576.312.32  
**A study of chromosome ends in salivary gland nuclei of *Drosophila*.**  
*Biol. Bull. Wood's Hole* 1945 : 88 : 144-65.

Specificity in the behaviour of chromosome ends in terminal adhesions was observed, and found to be dependent upon proximity for its expression and subject to change by mutation. The frequency with which adhesion occurs is not affected by the cytoplasmic genotype nor by temperature; the total incidence of adhesion is however affected by temperature. Intercalary regions associated with chromosome ends also showed specificity.

150. HAGERUP, O. 576.312.35:576.356.5:581.9(48)  
*Nordiske Kromosom-Tal. I. (Northern chromosome numbers. I.).*  
*Bot. Tidsskr.* 1941 : 45 : 385-95.

The study of the relations between polyploidy and ecological and geographical conditions has led to the establishment of a new branch of botanical research, cyto-ecology, to which the author here contributes the results of his investigations of Danish and Arctic plants, 20 of the chromosome numbers being new.

*Calla palustris* is of special interest, since the northern form has  $n = 2 \times 18$ , and the southern form only  $n = 18$ .

151. MEYER, J. R. 576.353:581.04:578.6  
**Colchicine-Feulgen leaf smears.**  
*Stain Tech.* 1943 : 18 : 53-56.

A description is given of the technique and several advantages of the colchicine-Feulgen leaf smear for mitotic studies.

\* General studies, see also individual crops.

152. ÖSTERGREN, G. 576.354.4:576.356.5:633.284  
**Equilibrium of trivalents and the mechanism of chromosome movements.**  
 Hereditas, Lund 1945 : 31 : p. 498. (Abst.).

The analysis of the equilibrium position of trivalents and bivalents during meiosis in autotriploids of *Anthoxanthum aristatum* has indicated that centromeres are attracted to spindle poles by forces increasing in strength with increasing distance between the centromere and pole, and that each centromere is attracted only by that pole towards which it is turned, in contradiction to Darlington's hypothesis of balanced repulsions.

153. DECOUX, L. and 576.356.5:581.04  
 ERNOULD, L.  
**Colchicine et polyploidie. (Colchicine and polyploidy).**  
 Publ. Inst. Belge Amélier. Better. 1943 : 11 : 363-426.

A review of the literature is given, including a list of 510 titles and a useful glossary. R. M. I.

154. LEVAN, A. 576.356.5:633:581.04(48.5)  
**Polyplodiförädlingens nuvarande läge. Föredrag vid 34 : de Svenska Lantbruksveckan den 20 mars 1945. (The present state of plant breeding by induction of polyploidy. Lecture delivered at the 34th Swedish Agricultural Week at Stockholm on March the 20th 1945).**  
 Sverig. Utsädesfören. Tidskr. 1945 : 55 : 109-43.

Natural and artificial polyploid plant forms and their value in crop breeding are discussed in the light of Scandinavian research with detailed reference to the physiological and morphological effects of artificially induced chromosome doubling in various genera.

A survey is then given of results obtained when the method was applied to different crops, e.g. flax, barley, rye-wheat, rye, cruciferous oil plants, sugar beet, timothy and clover.

Diallel crosses, begun in 1939 with six tetraploid flax strains have reached the  $F_5$  and in some of the best families plants with an average of six to seven seeds per capsule are common. Since the tetraploid seed is half as large again as the diploid seed, a tetraploid linseed with the same fertility as the diploids would be a great practical advance.

Tetraploid forms of Opal B, Kenia and Archer have recently been compared, in regard to sprouting and yield, with the corresponding diploids, while hybrids from Primus II crossed with a six-rowed winter barley have been compared with Primus (diploid) and Brio. After the  $F_7$ , line selection was applied to the hybrid material; marked differences between lines were noted in 1944 and selection is to be continued. The tetraploid hybrids show a great advance in regard to sprouting and yield, being in some cases only 6-7% and 14% respectively less than the diploids. Müntzing's results (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 981) on rye-wheat are cited.

As regards quality some rye-wheats in experiments at Ugerup have given a greater loaf volume per area than wheat.

As rye-wheat tends to germinate in the ear, the sensitive, so-called pan-cake test should be used to test flour from the hybrid for this defect.

Müntzing contributes unpublished figures for sprouting, yield and baking quality of diploid and tetraploid ryes in 1944.

Particulars are given of trials in 1944 of tetraploid rape, oil, turnip and white mustard in which the tetraploids (produced by the Chromosome Department) were inferior in yield and crude fat content to the diploids, though superior in crude protein. Tetraploid white mustards which could compete in yield with the diploids could, however, probably be obtained by selection. In 1944 systematic selection for fertility was begun.

Tetraploid sugar beet breeding is under the direction of the Svenska Sockerfabrika AB [Swedish Sugar Manufacturing Co. Ltd.] at their Hilleskög beet breeding institute and the results are to be published in collaboration with Rasmusson.

The present report therefore records only some special results of a number of smaller experiments conducted in the Root Crop and Chromosome Division of the Swedish Seed Association. The original material for these experiments were Hilleskög and Vilmorin varieties.

A collection of tetraploid  $F_1$  sugar beets which arose in 1939 in the progeny of four colchicine treated beets from Hilleskög was subjected to family selection for root weight and sugar content.

It seems likely that results of practical value could be obtained with tetraploids if a wider choice of initial material and more thorough selection were used.

In another experiment, the performance of tetraploid families in 1942 and 1944 in comparison with the diploids showed, on the average, superiority in sugar yield, though this may have been due to experimental conditions.

Family selection in 1941 and 1943 with Hillesög and Vilmorin material showed that in 1941 the Hillesög tetraploids equalled the diploids in yield of sugar, but the Vilmorin lines were inferior. In 1942 the tetraploid varieties were raised as separate seed lots and also as a mixture in which beets of Hillesög and Vilmorin varieties alternated. The  $F_1$  plants showed marked heterosis, all families being superior to the standards in root weight and all but one in the weight of sugar. The average yield increase for the  $F_1$  families was 12.5% higher than one parent and 24.8% higher than the other.

Sugar beet appears to tolerate chromosome reduplication without any immediate effects on vitality; breeding by hybridization within and between varieties should therefore give good results.

In a comparison of octoploid timothy strains with the ordinary Gloria variety and some hexaploids, the octoploids yielded less than the hexaploids though some nearly equalled Gloria. The octoploids produced so far have thicker stems and less foliage than normal. Work is still proceeding with forms with 21-90 chromosomes and over in order to determine the optimum chromosome number.

In 1939-40, red, alsike and white clovers were produced with reduplicated chromosomes, following colchicine treatment. The red clovers treated were Merkur, Wambåsa, Ultuna and Offer. The morphological effects of polypliody were studied in a clone discovered in 1940 comprising both diploid and tetraploid derivatives. Tetraploids were found to have fewer leaves on the average than the diploids and their pollen fertility was somewhat reduced. The seed yield of tetraploid Merkur and Merkur hybrids was at the rate of 132.5 kg. per ha. The tetraploids far surpassed the diploids in yield of green parts, while they had a higher water content and an equal or somewhat lower crude protein content and fewer leaves.

In a second comparative trial in 1942, only two tetraploid varieties surpassed the standard (diploid Merkur) in total yield from the first and second cut, though tetraploids gave a good second cut. The cross Wambåsa x Offer produced the two lowest yielding hybrids. Water content again proved higher in the tetraploids, but protein and crude fibre show no consistent differences between the diploid and tetraploid.

In 1943 for the first time, tetraploid red clover (three strains of Merkur and Merkur x Wambåsa), was included in trials on a larger scale. One series of experiments included also six other commercial strains, and another series, seven newly-bred strains. The results showed that all three tetraploids exceeded the diploid commercial and breeder's strains in the total quantity of green parts, the average for all three being 14% higher than the diploid Merkur.

Breeding by induced polypliody should be most successful with cross-fertilized plants grown for the yield of vegetative parts and with low chromosome numbers, e.g. red clover and sugar beet; its probable value with the other crops is mentioned.

## SEXUALITY 577.8

155.

JAEGER, P.

577.8:576.12

Contribution à l'étude de la gynodioecie. (**Contribution to the study of gynodioecism**).

Bull. Soc. Bot. Fr. 1939 : 86 : 395-403.

Gynodioecism is defined as the condition found in a species having some plants with hermaphrodite flowers and others with only female flowers. The present study concerns the development of dioecism in higher plants as a secondary condition arising from the bisexual or hermaphrodite form, two lines of evolution being considered: (1) towards gynoecism or female unisexuality, and (2) towards androecism or male unisexuality.

The author's own genetic experiments with *Knautia sylvatica* have shown that (1) the progeny of female plants always contains both gynomonoecious and female forms, the latter invariably predominating; and (2) the gynomonoecious individuals also give a mixed progeny in which, again, the parental type predominates.

Various still unsolved problems of the nature of gynodioecism will, it is believed, require cytogenetical investigation.

## MICROSCOPIC TECHNIQUE 578.6

578.6

156. WITLIN, B. 578.6  
**Darkfield illuminators in microscopy.**  
 Science 1945 : 102 : 41-42.  
 An improvised dark-field stop is described, which can be inserted into an ordinary sub-stage Abbe condenser, thereby eliminating the need for a special dark-field condenser.

157. SPEESE, B. M. 578.6:576.312.35  
**Chromosome mounts for temporary study.**  
 Science 1945 : 102 : p. 256.  
 Zirkle's solution, or a modification in which 45% acetic acid is substituted for acetocarmine, is recommended for ringing chromosome smears prepared with acetocarmine, propiocarmine or Feulgen's reagent.

158. WITTLAKE, E. B. 578.65  
**Permanent prestaining in botanical microtechnic.**  
 Ohio J. Sci. 1944 : 44 : 36-38.  
 A method of pre-staining in which the stain of the bulk material becomes the primary stain of the finished preparation is described. The method has been successfully applied to a variety of plant tissues.

## \*BOTANY 58

159. TATUM, E. L. 581.192:575.24  
**Are gene mutations responsible for the growth factor requirements of micro-organisms?**  
 J. Bact. 1945 : 49 : 202-03.  
 The theory is developed that specific genes are responsible for each step of the biochemical reactions of the cell, and that the mutation of these genes may result in the cell becoming heterotrophic for the constituents whose syntheses are catalysed by the enzymes determined by the original genes.

160. FAGERLIND, F. 581.3:581.163  
 Die Samenbildung und die Zytologie bei agamospermischen und sexuellen Arten von *Elatostema* und einigen nahestehenden Gattungen nebst Beleuchtung einiger damit zusammenhängender Probleme. (**Seed formation and cytology in agamospermic and sexual species of *Elatostema* and some neighbouring genera, with an elucidation of some related problems**).  
 K. Svenska VetenskAkad. Handl. 1944 : 21 : No. 4 : Pp. 130.

Although this paper is primarily concerned with macrosporogenesis in the Urticales, it contains a valuable discussion of the general phylogenetic significance of the various types of sporogenesis observed, of polyploidy, and of apomixis. The vexed problem of terminology of apomictic phenomena is also treated.

161. SMITH, H. M. 582:001.4  
**Categories of species names in zoology.**  
 Science 1945 : 102 : 185-89.

This discussion on the status of specific names in zoological nomenclature may be of interest to plant systematists, especially the remarks relating to *nomina nuda* and *nomina dubia*.

## AGRICULTURE 63

162. WITTE, H. 631.521.5:633(48.5)  
 Sveriges Fröodlareförbunds Riksfröutställningar under åren 1921-1945.  
**(National seed shows of the Swedish Seed Growers Union during the years 1921-45).**

Sverig. Utsädesfören. Tidskr. 1945 : 55 : 201-30.  
 This survey treats of the origin and aims of the Swedish national seed shows and their programme, with information on the places and times when they were held; the numbers of samples shown of various crops (including vegetables) in various regions; official sampling; the quality of the exhibition samples; and judging and awards.

Stricter regulations through the agency of the State Central Seed Control Institute of the strain names are urged to eliminate the present practice of allowing such names to appear in show catalogues without an explicit guarantee of cultivation value.

\* General studies, see also individual crops.

163. GÄUMANN, E. 632-1.521.6:58  
 Immunität und Immunitätsreaktionen bei Pflanzen. (Immunity and immunity reactions in plants).  
 Vjschr. Naturf. Ges. Zürich 1944 : 89 : p. 221.  
 This is a brief summary of a lecture delivered by the author on the resemblances and differences between the immunity reaction in plants and in man.

164. HILDEBRAND, E. M. 632.3:576.16  
 The genetic designation of "strain" in bacteriology.  
 Science 1945 : 102 : 101-02.  
 A criticism is made of Chapman's suggestion (cf. *Plant Breeding Abstracts*, Vol XV, Abst. 1347) that bacterial strains should only be distinguished if known to be genetically unrelated. It is stated that no reliable method of determining genetical relations in the bacteria is available.

165. WAKSMAN, S. A. 632.3:581.04  
 REILLY, H. C. and  
 SCHATZ, A.  
 Strain specificity and production of antibiotic substances. V. Strain resistance of bacteria to antibiotic substances, especially to streptomycin.  
 Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 157-64.  
 Strains of *Escherichia coli*, *Proteus vulgaris*, *Staphylococcus aureus* and *Bacillus subtilis* differ *inter se* in their sensitivity to streptomycin, streptothricin and clavacin.

166. WAKSMAN, S. A. and 632.3:581.192  
 SCHATZ, A.  
 Strain specificity and production of antibiotic substances. VI. Strain variation and production of streptothricin by *Actinomyces Lavendulae*.  
 Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 208-14.  
 Strains of *A. Lavendulae* differ *inter se* in their capacity for producing streptothricin.

167. TATUM, E. L. 632.3:581.192:537.531:575.243  
 X-ray induced mutant strains of *Escherichia coli*.  
 Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 215-19.  
 X-irradiation of *E. coli* has given rise to strains unable to synthesize one or other of the following substances: proline, glutamic acid or proline, leucine, *iso*-leucine, phenylalanine, methionine, cystine, histidine, thiamin, vitamin thiazole, or an unidentified substance from yeast extract. It is believed that these deficiencies arose through a process of gene mutation comparable to that of the higher plants.

168. RICHARDS, O. W. 632.3:633.491:535.371:535.61-31:578.6  
 The *Actinomyces* of potato scab demonstrated by fluorescence microscopy.  
 Stain Tech. 1943 : 18 : 91-94.  
 The potato scab, *Actinomyces*, can be selectively impregnated with carbol-auramin, fluorescing bright yellow when exposed to ultra-violet radiation. The method of staining is described, prior to examination of the material with a simple fluorescence microscope.

169. DODGE, B. O. 632.4:575.1:001.4  
 Further remarks on mycogenetic terminology.  
 Mycologia 1945 : 37 : 629-35.  
 It is suggested that further precision in the use of genetical terms would be effected if the term "choriheterosis" were used for the stimulus causing heterocaryotic vigour in the fungi, and the term "synheterosis" for the stimulus causing hybrid vigour in diploid organisms.  
 A discussion is also presented of the meaning of the terms "heterothallism" and "haplodioecism".

170. WINGE, Ö. 632.4:575.127.2  
 Croisement inter-spécifique chez les champignons. (Interspecific hybridization in the fungi).  
 Scientia Genetica 1941 : 2 : 171-89.  
 The author discusses the nature of fungous hybridization, with special reference to his own

\* General studies, see also individual crops.

researches with *Saccharomyces*. Two types of hybridization are distinguished: (a) dicaryophytic hybridization, in which hyphal fusion is not accompanied by nuclear fusion; and (b) true hybridization, when nuclear fusion also occurs.

171. SCHULTZ, H. 632.4:576.16:635.651  
 Untersuchungen über die Fusskrankheit der Ackerbohne. (**Studies of foot rot of the broad bean**).  
 Zbl. Bakt. 1943 : 106 : 38-50.  
 [From Exp. Sta. Rec. 1944 : 91 : p. 426].

*Fusarium* spp. are amongst the principal agents causing foot rot in *Vicia Faba*, whilst *Pythium* and *Rhizoctonia* are also concerned. The symptoms, economic significance and distribution of this disease complex are discussed. Inoculations have been made in the greenhouse and field to test the pathogenicity to broad beans of numerous strains of *R. Solani*, *P. debaryanum*, *P. irregulare* and *F. avenaceum*. The results indicate that many strains of *Rhizoctonia* and *Fusarium* are severely injurious, whereas the *Pythium* species are only weakly pathogenic.

172. RAPER, K. B. and 632.421.2:575.22:631.557  
 ALEXANDER, D. F.  
**Penicillin: V. Mycological aspects of penicillin production.**  
 J. Elisha Mitchell Sci. Soc. 1945 : 61 : 74-113.

The report is given of the detailed investigation of the natural variation and penicillin production in the four different cultures now in general use for the commercial production of penicillin. Methods of selecting high penicillin-producing strains are discussed.

173. MOYER, A. J. and 632.421.2:575.242:535.61-31:577.15(73)  
 COGHILL, R. D.  
**The laboratory-scale production of itaconic acid by *Aspergillus terreus*.**  
 Arch. Biochem., N.Y. 1945 : 7 : 167-83.

A mutant strain of *Aspergillus itaconicus*, NRRL 265, produced by ultra-violet irradiation of the spores, has been found which readily ferments glucose to itaconic acid when grown on the surface of shallow layers of a liquid medium.

174. THOM, C. 632.421.2:581.6:575.242:575.42  
**Mycology presents penicillin.**  
 Mycologia 1945 : 37 : 460-75.

Historical details of the discovery of penicillin are presented, and the various principles and problems of its production from *Penicillium notatum*, *Aspergillus flavus* and *A. flavipes* are discussed, including the variability of strains, which may cause deterioration of stock, and the possibilities of greatly increasing yield by the systematic selection of natural or artificial mutants.

175. LINDEGREN, C. C. and 632.421.2:581.6:577.8  
 ANDREWS, H. N.  
**Cytoplasmic hybrids in *Penicillium notatum*.**  
 Bull. Torrey Bot. Cl. 1945 : 72 : 361-66.

Certain strains of *P. notatum* can anastomose *inter se* with the production of heterocaryotic mycelia; in other cases, the hyphae show no tendency to fuse. Heterocaryons from as many as three parent strains have been obtained. Although a few cases of increased penicillin production following heterocaryosis have been reported, in most cases hyphal fusion leads to a decrease in penicillin productivity. It is believed that the comparative infrequency of naturally occurring high-yielding strains of *P. notatum* is owing to the fact that most wild strains are probably complex heterocaryons.

176. RIZET, G. 632.421.9:577.8:575.11  
 La valeur génétique des périthèces nés sur des souches polycaryotiques chez le *Podospora anserina*. (**The genetical significance of the perithecia borne on polycaryotic strains of *P. anserina***).  
 Bull. Soc. Bot. Fr. 1941 : 88 : 517-20.

A discussion is presented of the segregation ratios to be expected in the types of mycelia formed from spores developed in perithecia borne on polycaryons. Examples are cited from observations on *P. anserina*.

177. HOROWITZ, N. H.,  
 BONNER, D.,  
 MITCHELL, H. K.,  
 TATUM, E. L. and  
 BEADLE, G. W. 632.421.9:581.192:575.17  
**Genes as physiological agents. Genic control of biochemical reactions in *Neurospora*.**  
*Amer. Nat.* 1945 : 79 : 304-17.

A succinct review is given of the work done at Stanford University on the biochemical genetics of *Neurospora*. It is probable that the genes direct chemical reaction via the regulation of enzyme synthesis. Moreover, a one-to-one correspondence between genes and the constituent stages of chain reactions has been demonstrated.

178. RUIZ O., M. 632.422.2:582  
**Contribución al conocimiento de las levaduras del aguamiel y del pulque.**  
**(Contribution to the knowledge of the yeasts of hydromel and pulque):**  
*An. Inst. Biol. Univ. Méx.* 1942 : 13 : 1-21.

A new species *Rhodotorula incarnata* is described, also its behaviour in culture. It occurs in the hydromel from agave and in the beverage pulque produced from it.

179. LINDEGREN, C. C. and 632.422.3:575:578  
 LINDEGREN, G.  
**Selecting, inbreeding, recombining, and hybridizing commercial yeasts.**  
*J. Bact.* 1943 : 46 : 405-19.

"A breeding program for *Saccharomyces cerevisiae* must be based on the maintenance, under laboratory conditions, of strains producing viable ascospores, since the ascospores produce the gametes. The strains can be maintained if each generation is cross-bred, for the ability to produce viable ascospores depends on the maintenance of heterozygosis of the mating-type alleles, or self-sterility genes. Selection and inbreeding eliminate undesirable recessive genes from the strain. Breeding strains from which these undesirable recessives have been eliminated can be used in hybridization experiments. This technique of improving commercial yeasts differs radically from previous methods which were probably based on the accidental selection of single ascospore cultures from wild yeasts".

180. LINDEGREN, C. C. and 632.422.3:577.16:575.11  
 LINDEGREN, G.  
**Vitamin-synthesizing deficiencies in yeasts supplied by hybridization.**  
*Science* 1945 : 102 : 33-34.

*Saccharomyces cerevisiae* appears to be heterozygous for the gene determining pantothenic acid synthesis and segregates into haploid strains capable and incapable of synthesizing this vitamin respectively. When the latter haploid strain is mated with *S. carlsbergensis*, which cannot synthesize pyridoxine, an  $F_1$  hybrid is formed able to synthesize pantothenic acid, pyridoxine and biotin, the latter being formed only in small quantities by *S. cerevisiae*. A hybrid derived from *S. cerevisiae* and *S. globosus*, the latter being unable to synthesize thiamine, was found to synthesize both this vitamin and pantothenic acid.

181. WINGE, Ö. 632.422.3:577.8  
**Sur l'hétérothallisme du *Saccharomyces Ludwigi*.** (The heterothallism of *S. Ludwigi*).  
*Scientia Genetica* 1941 : 2 : 167-70.

The author discusses the data presented by Manuel on the heterothallism of *S. Ludwigi* Hansen. The statement of the latter that the two ascospores from each ascus which germinate abnormally give rise to giant colonies is queried.

182. RUIZ O., M. 632.422.3:582  
**Contribución al conocimiento de las levaduras del aguamiel y del pulque IV.** (Contribution to the knowledge of the yeasts of hydromel and pulque IV).  
*An. Inst. Biol. Univ. Méx.* 1941 : 12 : 49-68.

The morphological and physiological properties are described of a newly discovered species of yeast, *Torulopsis aquamellis*, which is found in the agave hydromel used in the preparation of the beverage pulque.

183. RUIZ O., M. 632.422.3:582(72)  
 Contribución al conocimiento de las levaduras del aguamiel y del pulque.  
 III. *Torulopsis hydromelitis* n.sp. (Contribution to the knowledge of the  
 yeasts of hydromel and pulque. III. *T. hydromelitis* n.sp.).  
 An. Inst. Biol. Univ. Méx. 1940 : 11 : 539-54. -  
 An account is given of the morphological and cultural characteristics of the newly discovered  
 yeast *T. hydromelitis*; it occurs in the hydromel of the agave used in preparing pulque.

184. BEVER, W. M. 632.451.2:576.16:575.12(73)  
**Hybridization and genetics in *Ustilago Hordei* and *U. nigra*.**  
 J. Agric. Res. 1945 : 71 : 41-59.  
 Evidence was obtained indicating that the range of virulence of *Ustilago Hordei* and *U. nigra*  
 may be combined by interspecific and intraspecific hybridization, new physiological races thus  
 being formed.

185. HOLLANDE, A.-CH. and 632.8:576.31  
 HOLLANDE, G.  
 Remarques au sujet de la structure cytologique de quelques microbes.  
 (Remarks on the subject of the cytological structure of some microbes).  
 Bull Soc. Bot. Fr. 1943 : 90 : 109-10.  
 The presence of a continuous tubular structure, either in the form of a flattened ring, a figure-of-  
 eight, a chain of figure-of-eight units, or more rarely a spiral, is reported in the cells of various  
 coccoid bacteria, *Bacillus*, *Bacterium* and *Bacillospira* species. Chromatin may be deposited  
 on this tube at certain stages in the development of the cell. The homologies of this body and  
 other bacterial cell contents with the cell contents of higher plants are discussed.

186. RYŽKOV, V. L. 632.8.00.15  
 (The theoretical basis of virus diseases of plants. General theory of  
 viruses).  
 Akademija Nauk Sojuza S.S.R. Institut Mikrobiologii (Acad. of Sciences  
 U.S.S.R. Inst. of Microbiology) 1944 : Pp. 223.  
 This work consists of three parts on : (I) the general theory of filtrable viruses and their nature;  
 (II) the description of the virus diseases of plants and methods of control; and (III) methods of  
 investigation. The introduction with its annotated bibliography deals with problems and  
 achievements in the field, stress being laid on the work of Russian investigators. The chapters  
 of interest to plant breeders are reviewed below:—  
 (Variability of phytopathological viruses). (pp. 97-  
 108).  
 Evidence of the existence of different strains of viruses is surveyed from the standpoints of (1) the  
 manifestation of different symptoms produced by the same virus; (2) different rates of penetra-  
 tion of different strains into plant tissues, with resultant differences in the effects produced in  
 tissues of different ages; (3) the plant species attacked and the different effects of virulent and  
 weak strains of potato virus; and (4) physiological, chemical and serological physical differences  
 between strains and the methods of isolating strains used in work on tobacco mosaic. Findings  
 regarding the origin and persistence of new strains are illustrated from the work of Salaman  
 and others, and the role of the nucleoproteins in plant and animal cells is mentioned in relation  
 to the problem of variation and inheritance.  
 (Serological diagnosis of virus disease of plants).  
 (pp. 109-15).  
 Results of research on immunological reactions, the preparation of antigens and the virus as an  
 antigen are discussed.  
 (The classification of viruses and virus diseases).  
 (pp. 116-26).  
 The classification of viruses and virus diseases is dealt with.  
 (Physiological changes in virus diseases of plants).  
 (pp. 127-48).  
 Physiological changes in virus diseases of plants are treated in the light of existing knowledge of  
 various aspects of plant metabolism.

(*Methods of infection and epiphytology*). (pp. 168-79).

Methods of infection and the epiphytology of virus diseases are discussed.

(*Susceptibility and immunity to virus diseases in plants*). (pp. 180-95).

The body of experimentation and evidence on this subject is reviewed under the aspects of specialization of viruses and immunity of different species; localized necrosis; genetic aspects of immunity; resistance of varieties and the causes of resistance in species and varieties; resistance within a variety; and acquired immunity.

A list of phytopathogenic viruses and an extensive bibliography of relevant literature from English, American, Indian, Russian and other sources concludes the manual.

187. V. ...., M. 632.951.1:575.42(67.5)

*Derris et Lonchocarpus*. (*Derris and Lonchocarpus*).

Bull. Agric. Congo Belge 1943 : 34 : 259-60.

This note refers to selection work now in progress in the Belgian Congo on the insecticide plants *D. elliptica*, *D. malaccensis*, *L. Nicou* (= *L. utilis*) and *L. Urucu*.

188. JONES, M. A. 632.951.1:578.65:575.42(73)

**Application of a modified red-color test for rotenone and related compounds to *Derris* and *Lonchocarpus*.**

J. Ass. Off. Agric. Chem., Wash. 1945 : 28 : 352-59.

A modified method of the seed colour test is described, and the applicability of the test to the analysis of small samples and in plant selection is discussed.

189. GUNTHER, F. A. and 632.951.1:581.8(73)

TURRELL, F. M.

**The location and state of rotenone in the root of *Derris elliptica*.**

J. Agric. Res. 1945 : 71 : 61-79.

A histological investigation of the occurrence of rotenone is described.

### ECONOMIC PLANTS 633

190. BATALLA DE RODRIGUEZ, M. A. 633:001.4(72)

Estudio de las plantas cultivadas en la región de Izúcar de Matamoros, Pue. (**Study of the cultivated plants in the region of Izúcar de Matamoros, Puebla**).

An. Inst. Biol. Univ., Méx. 1942 : 13 : 463-89.

RIVERA MORALES, I. and

MIRANDA, F.

Nombres vulgares de plantas en el S.O. del estado de Puebla. (**Vernacular names of plants in the south-west of the State of Puebla**).

Ibid. 1942 : 13 : 493-98.

These two articles include useful information on the vernacular names of cultivated and other plants in south-western Puebla.

191. BUSTARRET, J. 633:575.22

Variétés et variations. (**Varieties and variations**).

Ann. Agron. Paris 1944 : (N.S.) 14 : 336-62.

A general account is given of the natural variation exhibited by cultivated plants. The notion of variety is examined in its twofold application to botanical species and cultivated crops. Consideration then follows of the type of variation exhibited by lines and clones, of the comparative behaviour of autogamous and allogamous genetical populations, and of the role of hybridization and mutation in maintaining variability.

192. L'expérimentation au champ dans les stations de recherches agronomiques Françaises. (**Field experimentation at the agricultural experimental stations of France**).

Ann. Agron., Paris 1943 : 13 : 295-331.

In a review of the results of investigations dealing mainly with various cultural problems, a

discussion of methods of plot design, sampling, varietal trials of different crops, and statistical analysis, is included.

193. RODRÍQUEZ SARDIÑA, J. 633-2-1.521.6(46)  
La obtencion de plantas resistentes a enfermedades. (**The production of plants resistant to diseases**).  
Bol. Pat. Veg. Entom. Agric., Madrid 1942 [? 1943] : 11 : 43-96.

A long and detailed account is given of the techniques of breeding for disease resistance. After a preliminary account of the nature of biological variation and the status of regional races and biotypes, a description is given of methods of artificial inoculation, of investigations into the biology of the pathogen, of estimating the degree of virulence of pathogens, and of assessing the field susceptibility of crops.

Physiological specialization of the parasite and the danger of mutation are next considered, together with the nature of resistance and immunity and the genetical basis for these characters. Finally, a description is given of selection methods, hybridization, transgressive breeding, and the perpetuation of new resistant lines.

194. RUDORF, W. 633-2.111-1.521.6:578.08  
Methoden zur Prüfung und Züchtung von Kulturpflanzen auf Frostresistenz. (**Methods of testing and breeding crop plants for frost resistance**).  
Z. ges. Kälteindustr. 1941 : 48 : 121-27. [From Z. Pflanzenz. 1942 : 24 : p. 609.]

Dealing particularly with the physiological properties determining winter hardiness, the author points out that the various physiological differences produced in plants by the autumn hardening process are not a certain indication of the degree of frost resistance. Artificial freezing experiments have been the most reliable method of selecting frost resistant varieties. The technique of this method is discussed.

### CEREALS 633.1

195. ÅKERMAN, Å. 633.1-2.111-1.521.6  
Några erfarenheter rörande höstsädens övervintring samt om vinterhärdigheten hos olika höstvetesorter. (**Some findings regarding the overwintering of autumn cereals and the winter-hardiness of different autumn wheat varieties**).  
K. LantbrAkad. Tidskr. 1945 : 84 : 192-215.

In the course of this survey of work done in Sweden on frost resistance in cereals, the author discusses the physiological basis of the condition and the value of freezing trials under laboratory conditions and records the winter hardiness of numerous more recent winter wheats commercially grown in Sweden. The land wheats include Finnish, Norwegian, Estonian and American types (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 162). Many of these and some Russian varieties are very winter hardy. Good frost resistance has also been exhibited by Swedish improved wheats, e.g. Svea II, Thule III, Pärl [Pearl], Jarl [Earl] and Gluten, the latter being remarkable in combining early ripening and unique baking quality, though unfortunately it is not as drought resistant as some other varieties. Wheats from England, France and other Western European countries were deficient in winter hardiness.

Care in the choice of suitable winter-hardy varieties for southern Sweden is urged; suitable high-yielding varieties with strong straw and good quality of grain combined with improved frost resistance should be specially bred for this region. G. Andersson's work will doubtless lead to considerable improvement in the technique of freezing experiments.

Various ways in which Swedish breeders are trying to breed new varieties combining high yield and frost resistance are outlined. Among the promising new wheats cited are Virtus, bred at Weibullsholm from Ergo x Svea II, and the Svalöf strains U 01391 (Ergo x Gluten), 01420 (Skandia II x Land Wheat) and Ög 01440 (Bore I x Velvet Wheat). Extensive work on hardy combinations is in progress.

As a basis for further breeding work frost resistance and hardening should be intensively studied, not only in cereals, but also in legumes and oil crops, such as rape and turnip rape.

A bibliography bearing chiefly on the physiological aspects of cold resistance is appended.

## WHEAT 633.11

196. BAYLES, B. B. 633.11:575(75.2)

### **Hard winter wheat improvement in the future.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 52-57. (Mimeographed).

Various problems of breeding work are examined. These include the following: (1) the need for further information concerning the characteristics of protein in different varieties which determine the value of the bread flour, the interrelationship between various characteristics of quality and environment, and the question whether the high test weight of Chiefkan and Red Chief can be transferred to other varieties without at the same time transferring the undesirable characters of their protein; (2) a closer understanding of the relation between time of maturity and winter hardiness; (3) further knowledge as to the physiological races of leaf and stem rust, the dissemination of diseases and the genetics of resistance; (4) a study of the morphological characters determining resistance to lodging, and of resistance to drought and high temperatures; (5) the breeding of varieties adapted to conditions in the zone intermediate between the hard red winter and soft red winter belts; and (6) an investigation of hybrids of various species of *Agropyron* and wheat as new sources of disease resistance and other qualities.

197. BAYLES, B. B. 633.11:575(77.1)

### **General aspects of the soft wheat improvement program.**

Rep. 8th East. Wheat Conf. Cincinnati, Ohio November 10, 1943 (1944) : p. 16. (Mimeographed).

Emphasis is laid on the desirability of developing new soft wheat varieties suitable for growing as a companion crop for legumes and grasses, and on the importance of breeding for grain quality. Satisfactory progress is briefly described in the work of breeding winter hardy soft varieties for the transitional zone between the regions of cultivation of hard and soft wheats.

198. 633.11:575(77.6)

### **Agronomic aspects of hard spring wheat breeding. 6. Objectives in breeding programs and outlook for next three years.**

Rep. Mill. Baking Mtg., 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 47-48. (Mimeographed).

The objectives of the breeding work at the different stations are outlined.

The possibilities of breeding for scab resistance is receiving considerable attention, particular importance being attached to the scab resistant wheats of Chinese origin. The need for wheats with improved drought resistance for cultivation in the west of the spring wheat region is also discussed, reference being made to Comet and Comet x No. 1018 and No. 1315, which have proved to be drought resistant.

199. SALMON, S. C. 633.11:575(77.6)

### **Agronomic aspects of hard spring wheat breeding. 9. Where do we go from here.**

Rep. Mill. Baking Mtg. 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 51-53. (Mimeographed).

The success in recent years of breeding for specific objectives is outlined, with particular reference to the production of varieties showing improved resistance to stem and leaf rust, and future problems such as still further improved disease resistance, resistance to lodging and shattering, dates of maturity and drought resistance, are discussed.

200. SMITH, G. S. 633.11:575(77.6)

### **Agronomic aspects of hard spring wheat breeding. 7. The durum wheat breeding program, 1944.**

Rep. Mill. Baking Mtg, 7th Hard. Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 49-50. (Mimeographed).

Mindum, a particularly valuable variety on account of its wide adaptability, disease resistance and high macaroni quality, has been used as a foundation parent in most of the 1500 crosses made in the improvement programme. With the production of the new varieties Carleton and Stewart, two of the objectives of the programme have been achieved, viz., improved stem rust

resistance and strength of straw. These varieties have been developed by a modification of the usual back-crossing method. The cross Mindum x Vernal was back-crossed twice to Mindum, selected  $F_3$  and  $F_4$  progenies being back-crossed instead of immediately back-crossing to Mindum, which method allowed selection for other valuable characters. Two other objectives are shorter straw and earlier maturity, particularly in view of the competition offered in the durum wheat growing region by the newer hard red spring varieties. Other characters receiving attention include resistance to black point and bunt, and a broader type of stem rust resistance, possibly the type of stem rust resistance possessed by the variety Pentad. The need of investigations on the problems of quality is discussed.

201. THROCKMORTON, R. I. 633.11:575(78.1)  
**Need for additional research from the agronomic point of view.**  
Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 42-46. (Mimeographed).

The various improvements which must be the aim of the plant breeder in breeding new wheat varieties for the hard red winter wheat region are discussed. These include the increased resistance to several diseases and insect pests, higher resistance to lodging, winter injury and drought, earlier maturity, and improved kernel characteristics and blending quality.

202. SMITH, G. S. 633.11:575(78.4)  
**Two new durum wheat varieties.**  
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1943 : 5 : No. 4 : 2-3.

The new varieties Carleton and Stewart have been developed from crosses between Spring Emmer and Mindum, selections being back-crossed twice to the Mindum parent. Both varieties are highly resistant to the race of black stem rust occurring on durum wheats, and compare favourably in macaroni quality with Mindum. Carleton shows more resistance to lodging than either Mindum or Stewart, but is less widely adapted than Stewart.

203. ROBERTSON, D. W. 633.11:575(78.8)  
**Winter wheat breeding program at Fort Collins.**  
Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 12. (Mimeographed).

Breeding objectives at Fort Collins, Colorado, have consisted of improvements in disease resistance, stiffness of straw, yield and quality, particular attention having been given to bunt resistance. Breeding to combine stem and leaf rust resistance with other desirable characters is in progress. In addition, preliminary studies have indicated that winter wheat varieties respond differently to a given date of planting.

204. CAFFERA, R. 633.11:575(82)  
**El trigo Kanred en los Estados Unidos de Norte América y en la Republica Argentina. (Kanred wheat in the U.S.A. and in the Argentine Republic).**  
"Granos" Semilla Selecta, B. Aires 1943 : 7 : Nos 10, 11 and 12 : 3-16.

The history of Kanred wheat and its dissemination in the U.S.A. is described; it reached its peak in 1924, when it was second only to Turkey, and since then has gradually receded. Its expansion in the pampas of Argentina was no less rapid and there it has been the object of further selection work. In Argentina too it was at one time among the three most popular varieties, and indeed in certain zones the most popular; but in latter years its place has been taken more and more by the newer varieties. It is now classed only among the "semi-hard" wheats, and in many areas its cultivation is no longer recommended.

205. SMITH, G. S. 633.11:575:007  
**M. A. Carleton, pioneer durum wheat scientist.**  
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1945 : 7 : No. 5 : 3-7.

A brief account is given of the work of Carleton, which besides the production of durum wheat in the United States also included important work in the early programmes of hybridization and breeding for disease resistance in cereals.

206. AUSEMUS, E. R. 633.11:575.12(77.6)  
**Breeding winter hardy wheats for the northern great plains area.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference,  
 Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis.,  
 Plant Ind. Sta., Beltsville, Md 1945 : 10-11. (Mimeographed).  
 The development of varieties with improved winter hardiness, disease resistance and baking quality is receiving attention. The Chinese wheats, Nanking 68, 221 and 239, showing high winter survival percentages, are to be crossed with disease resistant varieties. A programme of back-crossing is being carried out with the object of obtaining higher disease resistance and quality in commercial winter wheat varieties. The winter varieties Minturki and Marmin are being used as recurring parents, the spring wheats H44 and Hope as non-recurring parents.

207. REITZ, L. P. 633.11:575.12(78.1)  
**Breeding hard red winter wheat in Kansas.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference,  
 Manhattan, Kansas February 12, 13 and 14, 1945. Div. Cereal Crops Dis.,  
 Plant Ind. Sta., Beltsville, Md 1945 : 6-7. (Mimeographed).  
 A brief survey is given of the progress made during the period 1937-44 in the breeding of hybrids to obtain improvement in several directions.

208. SWANSON, A. F. 633.11:575.12(78.1)  
**Present status of winter wheat work at the Fort Hays Station.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference,  
 Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis.,  
 Plant Ind. Sta., Beltsville, Md 1945 : p. 8. (Mimeographed).  
 Advanced generation progenies from crosses involving Cheyenne, Early Blackhull and Tenmarq have shown good yields and high test weight. Crosses under preliminary study include Chiekan x (Oro x Tenmarq), (Chiefkan x Oro x Tenmarq) x (Marquillo x Oro) and Early Blackhull Hybrid x (Marquillo x Oro x Tenmarq).

209. MCFADDEN, E. S. 633.11:575.127.5:581.04:575(76.4)  
**What is being done with species hybrids in Texas—some new synthetic hexaploid wheats.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference,  
 Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis.,  
 Plant Ind. Sta., Beltsville, Md 1945 : p. 2. (Mimeographed).  
 By treating  $F_1$  hybrids with colchicine, the following hexaploids have been produced: *Triticum dicoccoides* Koern. crossed with *Aegilops caudata* L., *Ae. sharonensis* Eig., *Ae. speltoides* Tausch., *Ae. umbellulata* Zhuk., *Ae. comosa* Sibth. et Smith, *Ae. squarrosa* L. and *Ae. uniaristata* Vis.; *T. persicum* Vav. x *Ae. sharonensis* Eig.; *T. dicoccum* (Schrank) Schubl. x *Ae. sharonensis* Eig.; and *T. Timopheevi* Zhuk. crossed with *Ae. squarrosa* L., *Ae. uniaristata* Vis. and *Ae. bicornis* (Forsk.) Jaub. et Spach. One of the forms involving *T. dicoccoides* and *Ae. squarrosa* possesses the taxonomic characters of *T. Spelta* and produces completely fertile and cytologically regular  $F_1$  hybrids with that species and *T. vulgare*, indicating that the C genome of the cultivated hexaploid wheats has been contributed by *Ae. squarrosa*. It is therefore possible to use *Ae. squarrosa* in transferring characters from tetraploid to hexaploid wheats, since the synthetic hexaploid should yield highly fertile hybrids with the cultivated hexaploid *T. vulgare*. Hybrids between other synthetic hexaploids, which carry genes for disease resistance and other valuable characters, and *T. vulgare* have been found to be at least partially fertile.

210. CÂMARA, A. 633.11:576.312.34:576.16  
**Estudo comparativo de cariotipos no género *Triticum*. (Comparative study of the caryotypes in the genus *Triticum*).**  
 Agron. Lusitana 1943 : 5 : 95-117.  
 Chromosome measurements were made in representatives of *T. monococcum*, *T. dicoccum* and *T. vulgare*, and figures are given of the ideograms. These show that there are seven chromosomes in *T. vulgare* which have no homologues in the other two species. The remaining 14 chromosomes of *T. vulgare*, though differing in certain details from the corresponding ones in *T. dicoccum*, could well have been derived from them in the natural processes occurring in the course of evolution.

In the discussion it is pointed out that bivalent formation occurs in haploids of *T. monococcum*. Moreover, this species contains two chromosomes which are morphologically very similar, two pairs of SAT chromosomes and four nucleoli. From this it is concluded that the original diploids had  $2n = 10$  chromosomes, which conforms to the basic number five for the Gramineae. The original diploids are supposed to have given rise to autotetraploids, from which unstable triploids arose, ultimately giving rise to the series of hexasomics with  $2n = 14$ , to which the present day *T. monococcum* and *T. aegilopoides* belong. The present tetraploid species cannot be regarded as autotetraploid since they contain only two pairs of SAT chromosomes and four nucleoli, like the diploids. They may, however, be amphidiploids having arisen from crossing between one form with one SAT and another with one secondary constriction, both of which might arise from segregation of the unstable triploid.

This still leaves the third genome of *T. vulgare* to be accounted for and it would appear quite definitely to be derived from some other genus.

211. ŠČERBAKOV, A. P.

633.11:581.142:581.04

(**Hastening the germination of seeds**).

Sovetskaja Botanika (Soviet Botany) 1944 : Nos 4-5 : 60-70.

Seeds of wheat belonging to many varieties were immersed in a solution containing 0.025 grm./mol. of  $\text{KNO}_3$  and 0.025 grm./mol. of  $\text{Ca}(\text{NO}_3)_2$ , which was kept at  $32^\circ$  to  $33^\circ$  C. for 5 hours. At the end of this period they were transferred to filter paper and again kept at  $32^\circ$  to  $33^\circ$  C. Soft wheats reacted to this treatment, their germination being hastened. Hard wheats were unaffected.

Swelling and sprouting were considered as separate processes; and it was the object of the experiments to find the best temperature and the right solution for ensuring the quickest possible rate of swelling in order that sprouting might begin the sooner. Respiration and other physiological processes connected with seed germination, and the work of some investigators into this subject, are discussed in the article.

I. Z.

212. HEYNE, E. G.

633.11:581.46:575.11:631.557(78.1)

**Effect of awns on yield and other characters in hard red winter wheat.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1-45 : 7-8. (Mimeo graphed).

In crosses of the awnless variety Chiefkan with the bearded varieties Tenmarq, Comanche and Cheyenne, the character of awn tips in Chiefkan exhibited simple dominance over the beardedness of the other three parents. The bearded segregates yielded more grain, and gave a higher test weight and weight per 500 kernels than the awnless group. The mechanical separation of large seed from bulk populations was found to alter the expected genetic ratio.

213. CHAO, JEN JUNG

633.11:581.6(51)

(**Report of a preliminary study on the grading of 33 samples of Chinese wheat**).

Fukien Agric. J. 1940 : 2 : 276-79.

Samples were graded into five main groups, viz., hard red winter, soft red winter, hard red spring, hard white and unclassified mixed wheat. Each group was further graded into flint, medium and starchy. In comparison with imported wheat these samples were found to have: (1) a higher degree of admixture of varieties; 14 out of 33 samples were mixed wheat, i.e. they contained more than 10% admixture; and (2) a higher percentage of damaged grains due mainly to insect pests.

T. C. Y.

214. MORRIS, V. H.

633.11:581.6:578.08(77.1)

**Tests useful in evaluating soft wheat varieties.**

Rep. 8th East. Wheat Conf. Cincinnati, Ohio November 10, 1943 (1944) : 6-10. (Mimeo graphed).

Methods available for testing the physical characteristics of the kernel, the quality of the gluten or flour strength, and various baking qualities, are critically discussed. The use of uniform nursery composites in the characterization and evaluation of varieties is described. The results of an analysis of the quality of several soft red winter wheats are summarized. The material consisted of the standard varieties, Trumbull and Fulcaster, the recently released varieties, Prairie, Fairfield and Thorne, and four unnamed selections.

215. WORZELLA, W. W. 633.11:581.6:581.02(77.1)  
**The effect of level of soil fertility on wheat quality.**  
 Rep. 8th East. Wheat Conf. Cincinnati, Ohio November 10, 1943 (1944) : 5-6.  
 (Mimeographed).

A brief report is presented of the results of a study of quality in five varieties when grown on three levels of soil fertility at each of three locations in Indiana during the period 1937-41. Varietal differences produced the greatest amount of variation in most of the components of quality investigated, and fertility level the least.

216. CAFFREY, M. 633.11:582(41.7)  
**The identification of varieties of bread wheat (*Triticum vulgare*).**  
 J. Dep. Agric. Eire 1945 : 42 : 6-19.

A comprehensive guide is given to the botanical and agronomic classification of wheats, with reference to varieties grown in Eire. The diagnostic value of 15 agronomic characters is discussed.

217. ATKINS, I. M. 633.11-1.421(76.4)  
**The use of nursery plots vs. field plots for varietal evaluation.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 15-16. (Mimeographed).

A comparison is made between the methods of nursery and field plots, and the advantages of the method of nursery plots are briefly described.

218. 633.11-1.421(77.6)  
**Agronomic aspects of hard spring wheat breeding. 8. Newer technics, equipment, and experimental designs.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 50-51. (Mimeographed).

A brief discussion is included of the comparative accuracy of the nursery and plot in varietal trials. Data were given indicating that yields from the nursery give a satisfactory basis of estimation provided more replications are used.

219. HEYNE, E. G. 633.11-1.421(78.1)  
**Use of new experimental designs.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, 1945 : p. 17. (Mimeographed).

Triple lattice and lattice square designs were used in rod-row varietal tests. The conclusions reached as a result of this study include: (1) estimates of error are valuable; (2) adjustments of yields are of questionable importance; (3) lattice designs do not contribute sufficiently to the practical results to repay the extra time necessary for their use; (4) a few refined tests cannot be substituted for less accurate tests in many locations and several seasons; (5) experimental methods of plot technique and the rod-row test need to be further investigated.

220. LAUDE, H. H. 633.11-1.421(78.1)  
**Field vs. nursery plots for varietal evaluation.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 16-17. (Mimeographed).

The method of nursery plot tests is discussed in comparison with the use of field plots. The opinion is expressed that several more replicates must be included in nursery tests than the number in present practice, to obtain the same degree of refinement of experimental data achieved in field plot tests, with a corresponding increase in labour.

221. SALMON, S. C. 633.11-1.421:575(75.2)  
**Techniques and progress in breeding wheat.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 14-15. (Mimeo graphed).  
 The importance in breeding work of the improvements in field plot technique and of other technical developments during the past 30 or 40 years is discussed.

222. LAUDE, H. H. 633.11-1.521.1(78.1)  
**Problems of varietal purity.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 5-6. (Mimeo graphed).  
 The problem of securing a high degree of purity in observable and unobservable characteristics in the production and increase of a variety is briefly discussed.

223. BAMBERG, R. H. 633.11-2.111-1.521.6:575.12(78.6)  
**Problems in breeding winter wheat for winterhardiness in Montana.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 11-12. (Mimeo graphed).  
 In breeding for resistance to dwarf smut, selections from the crosses Martin x Tenmarq and Turkey (C.I. 11530) x Oro have been obtained. Wasatch has been crossed and back-crossed to Yogo and two other winter-hardy wheats to combine resistance to dwarf smut and winter hardiness.

224. HANSON, E. W. 633.11-2.4-1.521.6(77.6)  
**Varietal reaction to diseases, St. Paul, Minn.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 40-41. (Mimeo graphed).  
 The results of tests of varietal reaction to stem and leaf rust, bunt, loose smut, scab, black point, and other diseases, carried out at St Paul, Minnesota, are given for 20 of the numerous varieties and selections tested. In general, durum wheats are more susceptible to foot rot than the bread wheats, Marquillo and Ceres being the most susceptible among the latter.

225. AUSEMUS, E. R. 633.11-2.421.9-1.521.6:575.11:575(77.6)  
**Bunt, rootrots, scab and other diseases in relation to wheat breeding.**  
**3. Scab. Scab studies with spring wheat.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 37. (Mimeo graphed).  
 A summary is given of the results of tests during the years 1933-43 in Minnesota of varietal reaction to head blight or scab, caused by *Gibberella Zeae*. Both in the field and under tents, Haynes Bluestem and Progress have shown the greatest resistance; the newer varieties Rival, Pilot, Hope, Merit, Vesta and Mercury have shown partial resistance. A significant positive relationship was obtained between the scab reaction of varieties grown in the field and under tents.  
 The inheritance of scab reaction was studied in the crosses (H-44 x Thatcher) x Haynes Bluestem and Rival x Haynes Bluestem. Several lines from each cross were more resistant than either parent, but the determination of the number of factors determining scab reaction was not possible. Correlation studies indicated that environmental conditions are of greater importance in the development of scab than the genetic factors controlling reaction to the disease.  
 In a study of  $F_3$  lines, reaction to stem rust was found to depend on two or three pairs of factors, reaction to leaf rust on one pair of factors, and awning on one pair of factors. These characters appeared to be independently inherited. Indication was obtained that the reactions to scab and leaf rust are linked in the crosses of Haynes Bluestem with Rival and H-44 x Thatcher. Several hybrid  $F_5$  progenies of crosses of Rival and H-44 x Thatcher with other varieties exhibit some scab resistance.

226. ATKINS, I. M. 633.11-2.451-1.521.6  
**Resistance of winter wheat varieties to artificial inoculation with loose smuts.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 30-31. (Mimeo graphed).  
 The reaction of a considerable number of varieties and strains to loose smut at three locations has been determined. The highest resistance, considering all three stations, was observed in the soft varieties : Kawvale, Currell, Trumbull and Leap; Pawnee is the only hard red winter wheat, adequately tested, that has exhibited high resistance; it is, however, only moderately resistant to both rusts. At Manhattan several strains of Kawvale x Marquillo and Kawvale x Tenmarq have shown promise as breeding material. Marked differential reaction of varieties was found at the three locations.

227. HANSING, E. D. 633.11-2.451-1.521.6:575.11(78.1)  
 633.11-2.451.3:576.16:631.521.6  
**Studies on bunt and loose smut in Kansas.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 31. (Mimeo graphed).  
 Of the four physiological races of *Tilletia foetida*, L-3, L-4, L-5 and L-7, recently identified in Kansas, L-3 is the most common. In inoculation tests, Comanche, Nebred and Oro were resistant to these four races and L-10; they showed moderate susceptibility to L-8. Pawnee and Turkey exhibited resistance or intermediate susceptibility to all the races of bunt; the majority of varieties were susceptible or resistant only to an intermediate degree. Various  $F_5$  hybrids have been obtained with the object of producing a bunt resistant winter wheat for Kansas, Nebraska and Colorado. A number of loose smut resistant selections have been developed from Tenmarq. A study is in progress of the inheritance of resistance to loose smut. Kawvale has been found to possess a dominant factor for resistance and possibly a modifying factor.

228. ATKINS, I. M. 633.11-2.451-1.521.6:575.12(76.4)  
 633.11-2.452-1.521.6:575.12(76.4)  
**The present status of wheat improvement work in north Texas.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 3. (Mimeo graphed).  
 The breeding material obtained in the programme of transferring disease resistance and improved quality to adapted strains and varieties of hard red winter wheat is described. One group of hybrids includes crosses of the bunt resistant strain Martin x Tenmarq (C.I. 11805) with the varieties Kharkof, Tenmarq, Chiekan and Blackhull. Another group consists of crosses involving Kharkof, Tenmarq, Kawvale x Tenmarq, Chiekan, Comanche and Hope x Mediterranean. A third group of hybrids has been obtained by using disease resistant strains of Kenya, Marquillo x Oro and other varieties, and *T. Timopheevi* in various combinations with Comanche, Wichita, Westar, Pawnee and Red Chief, to introduce rust and smut resistance into the latter recently developed varieties.

229. BEVER, W. M. 633.11-2.451.2:576.16:631.521.6(77.1)  
 633.11-2.451.2-1.521.6:581.143.26.03(77.1)  
**Physiologic specialization in *Ustilago tritici* and the effect of vernalization on the incidence of loose smut in artificially inoculated winter wheat.**  
 Rep. 8th East. Wheat Conf. Cincinnati, Ohio November 10, 1943 (1944) : 1-4. (Mimeo graphed).  
 A report is given of the preliminary results of pathogenicity tests under greenhouse conditions of loose smut collections from all regions of the United States. Ten winter wheat varieties have been tentatively chosen as differential varieties; among the 65 collections so far tested, nine different races of loose smut appear to be represented. Vernalization had little or no effect on the percentage of loose smut found on plants raised from inoculated seed.

230. RODENHISER, H. A. and  
HOLTON, C. S.

633.11-2.451.3-1.521.6:575(73)

**Distribution of races of *Tilletia foetida* and *T. caries* in relation to the wheat improvement program in the United States.**

Phytopathology 1945 : 35 : 488-89. (Abst.).

In bunt collections from 35 states in the United States, six states in Mexico and two provinces in Canada, 15 races of *Tilletia foetida* and 15 of *T. caries* have been identified. The most prevalent and widely distributed races of *T. foetida* are L-1, L-2, L-3 and L-4, the first three of which are pathogenic on the older commercial varieties. The most common races of *T. caries* are T-1, T-2 and T-4, the first two of which are pathogenic on the older varieties. Several other races of both species are pathogenic on the newer varieties which were developed primarily for smut resistance. The factors for resistance from Hope or H-44 provide a source of resistance for the spring wheats. The combined factors from Oro and Martin impart satisfactory resistance to the winter varieties. Both Ridit and Oro possess factors for resistance to all the races so far differentiated in collections from Mexico.

231. BAMBERG, R. H.

633.11-2.451.3-1.521.6:575(77.6)

**The dwarf bunt problem.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 33-34. (Mimeo graphed).

The new varieties Relief, Cache and Ridit x Relief show resistance to dwarf bunt. The two last named varieties are, however, insufficiently winter-hardy for the Flathead and Gallatin Valleys of Montana, where the disease has become very destructive. A programme of crossing and back-crossing the hybrid Ridit x Relief with Yogo and two other extremely winter-hardy varieties is in progress.

232. QUISENBERRY, K. S.,  
RODENHISER, H. A. and

JOHNSTON, C. O.

633.11-2.451.3-1.521.6:575.12(73)

**Bunt reaction of hard red winter wheats in 1938-42.**

J. Amer. Soc. Agron. 1945 : 37 : 514-22.

A large number of varieties and hybrid strains of hard red winter wheat have been tested at several stations during the period 1938-42 for reaction to a mixed inoculum of *Tilletia foetida* and *T. caries*. No variety was free from bunt in all tests, but considerable resistance was shown by selection from such crosses as Hope x Turkey 1069, H44 x Minturki, Oro x Tenmarq, Martin x Tenmarq and Blackhull x Oro. The more resistant varieties are under test to known races of bunt. Four strains were as resistant as Relief and eight as resistant as Hussar in tests for reaction to dwarf bunt in Utah. Most of these strains had Hussar, Martin or Ridit as one parent.

233. RODENHISER, H. A. and  
SMITH, R. W.

633.11-2.451.3-1.521.6:575.12(77.6)

**Bunt, rootrots, scab and other diseases in relation to wheat breeding.**

**1. Bunt. Varietal tests and physiologic race surveys. Bunt resistance studies at Dickinson, No. Dak.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 31-32. (Mimeo graphed).

In breeding for bunt resistance, the resistant winter and spring varieties Hussar, Ridit, Florence, Turkey x Florence and Hope have been crossed with Ceres, Komar, Reliance, Marquis and other varieties. In nursery tests in 1943 the hybrids [(Hope x Ridit) x Reward] x [(Komar x Hussar) x (Hope x Reliance)] and (Komar x Hussar) x [(Hope x Ridit) x Reward] showed no infection, while other hybrid combinations showed a high degree of resistance.

234. BAMBERG, R. H.

633.11-2.451.3-1.521.6:575.12(78.6)

**Breeding for resistance to bunt.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 28-29. (Mimeo graphed).

Available sources of resistance to common and dwarf bunts are described. Among the hard red winter wheats, four varieties have been found to be resistant to all races of common bunt, viz. Oro x [Turkey x Florence (C.I. 11865)], Rex x Oro (C.I. 12421), Rex x Rio (C.I. 12234), and Rio x

Rex (C.I. 12422). H44 x Minturki (C.I. 12414) is resistant to all except the recently identified races of *T. Tritici*, T-15 and T-16. Varieties of hard red spring wheats resistant to all races are Hope, Komar x Hussar (C.I. 11715), Regent x Pilot (C.I. 12317), Reliance-1018 x Mercury (C.I. 12204) and Renown. In breeding for resistance to dwarf bunt, Ridit, Hussar, Martin and Turkey provide sources of resistance, from which the following commercial varieties have been obtained: Relief (Hussar x Turkey), Cache (Ridit x Utah Kanred), Hymar (Hybrid 128 x Martin), and Wasatch (Ridit x Relief).

235. HART, H. 633.11-2.452:576.16:631.521.6(77.6)  
**Stem and leaf rust in relation to wheat breeding. 4. Artificial field epidemics with stem rust.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 27. (Mimeographed).

During the period 1939-43 approximately 40 recently developed hybrid varieties considered as highly or moderately resistant to stem rust and a few standard rust susceptible varieties were exposed under field conditions in Minnesota to an inoculum of 10 races. Under favourable conditions 35% infection occurred on Hope, McMurachy, the Kenya strains and *Triticum Timopheevi*, and 50-70% on such varieties as Rival, Thatcher, Carleton and Stewart. Race 15B was found to be usually most prevalent on Rival and Thatcher and was often the only race among the 10 races used that attacked most of the newer varieties.

236. LEVINE, M. N. 633.11-2.452:576.16:631.521.6(77.6)  
**Stem and leaf rust in relation to wheat breeding. 1. Relation of leaf rust to spring wheat improvement.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 24-26. (Mimeographed).

A brief survey is given of the occurrence of leaf rust races in the spring wheat growing region during the past 20 years. The data show that the standard differential varieties used in the identification of physiological races of leaf rust do not provide an adequate basis of information for breeding. Tests are in progress which include some 30 additional differential varieties.

237. LOEGERING, W. Q. 633.11-2.452:576.16:631.521.6(77.6)  
**Stem and leaf rust in relation to wheat breeding. 3. Greenhouse inoculations with stem rust.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 27. (Mimeographed).

A note is given on the work of testing the reaction under greenhouse conditions of many wheat varieties to different races of stem rust, to as many as 40 races in certain cases.

Red Egyptian, Na 101 and K 117 have shown some resistance to race 15 B.

238. STAKMAN, E. C. 633.11-2.452:576.16:631.521.6(77.6)  
**Stem and leaf rust in relation to wheat breeding. 2. Races of stem rust.**

Rep. Mill Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 26-27. (Mimeographed).

The problem of the origin of new stem rust races, and the data on the occurrence and distribution of new and old races, which are essential in the planning of a breeding programme for resistance, are briefly discussed.

239. VALLEGA, J. 633.11-2.452:576.16:631.521.6(82)  
**Razas fisiológicas de *Puccinia rubigo-vera tritici*, comunes en Argentina.  
 (Physiological races of *P. r.-v. tritici*, common in Argentina).**

An. Inst. Fitotéc. Santa Catalina 1942 : 4 : 40-57.

A general account is given of the races of *P. r.-v. Tritici* found in Argentina, and of the difficulties encountered in discriminating between some of these, owing to the variable reaction of the differential hosts. The races are grouped into two classes, the first, including races 13, 20, 26 and 49, not attacking the varieties Mediterranean, Democrat or Sinallocho, while the second, including races 5, 57, 62, 105 and 114, is highly virulent to these varieties. At the moment, this second group is hardly important enough to necessitate the breeding of varieties for specific resistance to it. The relative abundance of the various races since 1929 is considered and the relation between these races and the races A to F described earlier by Rudorf *et al.* is clarified.

240. REVILLA, V. A. 633.11-2.452:576.16:631.521.6(85)  
 Razas fisiológicas de la roya negra del trigo (*Puccinia graminis tritici*) encontradas en el Perú. (**Physiological races of the black rust of wheat (*P. g. tritici*) encountered in Peru.**)  
 Bol. Estac. Exp. Agric. "La Molina" 1945 : No. 26 : Pp. 16.  
 Races 14 and 15 of *P. g. tritici* have been identified from wheat fields in the coastal and sierra regions of Peru.

241. AUSEMUS, E. R. 633.11-2.452:576.16:631.521.6:575(77.6)  
**Stem and leaf rust in relation to wheat breeding. 7. Breeding for stem rust resistance in spring wheat.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 28-30. (Mimeographed).  
 The nature of resistance and the varietal sources of seedling and mature plant resistance to different physiological races of stem rust available for breeding purposes are described. With the discovery that certain wheats such as Kenya, Kenya x Gular, McMurachy, Bobin, *Triticum Timopheevi* x Steinwedel S990 and Red Egyptian are resistant to a considerable number of races in the seedling stage, many crosses have been made between these wheats and Thatcher, Hope and derivatives of Hope, in an attempt to combine seedling with mature plant resistance. Recently, the finding of the biotype of race 15, differentiated by Rival and designated 15B, has presented a further problem. Hope, Thatcher, some Kenya strains and *T. Timopheevi* x Steinwedel S990 are susceptible to 15B in both the seedling and mature plant stages. Two Kenya strains are highly resistant; Red Egyptian offers moderate resistance. Crosses are being made of Red Egyptian with Newthatch and a selection of the hybrid (*T. Timopheevi* x Steinwedel) x Premier, and of Red Egyptian and the two resistant Kenya strains with Newthatch, Thatcher and other varieties, to combine resistance to 15B and the common races.

242. STOA, T. E. 633.11-2.452-1.521.6:575(77.6)  
**Agronomic aspects of hard spring wheat breeding. 1. Introductory remarks.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 42. (Mimeographed).  
 The progress in the work of breeding improved and rust resistant varieties of hard spring and durum wheats, began in 1928, is briefly reviewed. It includes the production of Ceres, Thatcher, Newthatch, Mida, Carleton and Stewart.

243. CHESTER, K. S. 633.11-2.452-1.521.6:575.12  
**Breeding wheat for disease resistance in Oklahoma.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 25. (Mimeographed).  
 Selections showing considerable resistance to leaf and stem rusts and other desirable qualities, have been obtained from compound crosses involving Oro, Tenmarq, Hope, Hussar, Mediterranean, H-44 and several other varieties.

244. AUSEMUS, E. R. 633.11-2.452-1.521.6:575.12(77.6)  
**Breeding rust resistant winter wheats for the northern great plains area.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 26-28. (Mimeographed).  
 Back-crosses have been made between the varieties Minturki and Marmin, which are fairly resistant to stem rust but susceptible to leaf rust, and the spring wheats H44 and Hope, possessing resistance to both rusts and loose and covered smuts, Minturki and Marmin being used as the recurrent parents; promising results have been obtained. Hybrid lines derived from crosses between the rust selection N.S. II-26-29 from H44 x Minhardi and susceptible winter-hardy varieties have also show a high degree of resistance to both rusts. Some spring wheats such as certain Kenya varieties, McMurachy, Red Egyptian and *T. Timopheevi*-Steinwedel, have shown resistance in the seedling stage to stem rust, and will be crossed with winter varieties possessing the mature plant type of resistance.

A biotype of race 15 of stem rust, named 15B, has been differentiated by the variety Rival. The Kenya wheats, K58 and 117A, highly resistant to 15B, and the moderately resistant variety Red Egyptian, are being crossed with the most promising back-cross selections of Hope and H44 with Minturki.

Leaf rust resistance derived from Hope has not given satisfactory results. *T. Timopheevi*-Steinwedel S990, Brevit and Carina, carrying resistance to certain races, are being used in an attempt to combine in a single variety resistance to a number of races, which will then be transferred to winter wheat varieties.

245. JOHNSTON, C. O. 633.11-2.452-1.521.6:575.12(78.1)  
**Progress in breeding for rust resistance in wheat.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 24-25. (Mimeographed).

Progress in breeding for rust resistance is described. Nearly all the crosses are compound, involving three to five parent varieties. The most promising material has been obtained from rust-resistant selections of hybrids which include Mediterranean x Hope, Hope x Turkey, Hope x Cheyenne, Marquillo x Oro and Kawvale x Marquillo, crossed with hard red winter wheat varieties such as Tenmarq, Comanche, Pawnee, Nebred and Oro. Various crosses between winter and spring varieties are being studied. Selections from crosses involving Hope and H44 have been obtained which show little brown necrosis and also satisfactory rust resistance.

246. WEBSTER, O. J. 633.11-2.452-1.521.6:575.12(78.2)  
633.11-2.451.3-1.521.6:575.12(78.2)  
**Winter wheat improvement in Nebraska.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 9-10. (Mimeographed).

Progress is reported in selecting better adapted varieties resistant to bunt from the crosses Oro x [Oro x (Turkey x Florence)], Nebred x [Oro x (Turkey x Florence)], Oro x (Hussar x Hohenheimer), and Comanche x [Oro x (Turkey x Florence)].

Back-crossing is being carried out to improve stem rust resistant selections derived from the following hybrids: Hope x Ridit, [Ceres x (Hope x Florence)] x Turkey, Blackhull x (Ceres x H44), [Ceres x (Hope x Florence)] x Nebred, (Ceres x H44) x Cheyenne, and (Ceres x H44) x Turkey.

247. FELLOWS, H. 633.11-2.482-1.521.6(78.1)  
**Resistance to *Septoria* speckled leaf blotch.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 32. (Mimeographed).

In a two-years' study of reaction to *Septoria*, varieties showing most resistance are Red Chief, Ukrainka, Wisc. Ped No. 2, Brill, Mediterranean, Valley, Jenkin, Triplet, Yorkwin and Minhardi. Hybrid material showing considerable resistance includes Gelow x Oro, Clarkan x Eureka, (Marquillo x Oro) x (Hope x Kawvale), Marquillo x Oro and several combinations with *T. Timopheevi* as one parent.

248. SHANDS, R. G. 633.11-2.484-1.521.6(77.6)  
**Scab resistance of spring wheats at Madison, Wis.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 39. (Mimeographed).

In tests during the period 1930-36 of the reaction of 250 varieties and hybrids to scab, caused by *Fusarium graminearum* Schwabe and other *Fusaria*, the following showed some degree of resistance: selections of Illinois No. 1, Progress Haynes, Bluestem, Preston, Java (C.I. 4966), Kearney County Java, Albidum 0721 and several other varieties from Russia. Most of the commercial varieties tested exhibited susceptibility. It is pointed out that three of the resistant varieties, Illinois No. 1, Java and Kearney County Java, have been derived from the Java type which in turn originated from China. Reference is made to the possible sources of resistance to be found in Chinese varieties and varieties from other countries.

249.

ATKINS, I. M.

633.11-2.7-1.521.6(78.1)

633.16-2.7-1.521.6(78.1)

**Observations on resistance to green bugs in cereal crops.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 23. (Mimeo graphed).

Out of over 200 varieties of barley approximately 15 showed high resistance to green bug (*Toxoptera graminum* Rond.) attack, most of which varieties had their origin in China or Korea. Wheat varieties showed differences in reaction to the pest, but the resistance was not so high as that observed in barley. Relatively good resistance was observed in the cross Marquillo x Oro, and moderate resistance in Mediterranean strains and their hybrids. Early Blackhull and a few strains introduced from China and Russia were resistant, but their survival may have been partly due to their earliness.

250.

JONES, E. T.

633.11-2.7-1.521.6(78.1)

**Sources of resistance to the hessian fly.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 21. (Mimeo graphed).

In 11 years of field tests in Kansas and Missouri, all available varieties and strains of wheat have been tested in both the hard and soft winter wheat growing regions for resistance to Hessian fly. The varieties were classified into four groups corresponding to the resistance of a particular variety: (1) Kawvale type, semi-resistant and useful only in hard wheat growing districts; (2) Marquillo type, moderately resistant and valuable in the transitional zone between the hard and soft wheat growing regions; (3) Illinois No. 1 W38 type, highly resistant, and (4) Durum P.I. 94587 type, extremely resistant. Varieties included in groups (1) and (2) are largely red wheats and those in (3) and (4) white grained. The factors resulting in susceptibility to attack are briefly discussed.

251.

CALDWELL, R. M.,

CARTWRIGHT, W. B. and

COMPTON, L. E.

633.11-2.7-1.521.6:575.11:575(77.1)

**Status of breeding for hessian fly resistance in the soft red winter wheats.**

Rep. 8th East. Wheat Conf. Cincinnati, Ohio November 10, 1943 (1944) : 4-5. (Mimeo graphed).

The material available in breeding for resistance to Hessian fly attack is described. The resistance of the *T. vulgare* spring wheat, W8, is determined by a single incompletely dominant gene, which can be readily transferred to generally promising soft red winter wheats. Resistance provided by the factor from W8 is much reduced when seedlings develop under abnormally high temperatures, such as occur when the crop is sown earlier than good cultural practice permits. Utilization of the resistance of the *T. durum* variety, F.P.I. 94587, is more difficult, because more than one factor for resistance is operative and because of the sterility of hybrid progenies from crosses with varieties of *T. vulgare*. The resistance of F.P.I. 94587 has only been transferred in part to *T. vulgare* types. Combinations involving resistance derived from both W8 and F.P.I. 94587 give promise of resistance approaching that of F.P.I. 94587. The resistance of F.P.I. 94587 is definitely superior to that so far observed in varieties of *T. vulgare*, and shows no reduction as a result of abnormally high temperature. Similar resistance has been exhibited by ten other *T. durum* lines.

252.

PAINTER, R. H.

633.11-2.7-1.521.6:575.12(78.1)

**Breeding for resistance to hessian fly in hard red winter wheat.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 21-22. (Mimeo graphed).

The variety Pawnee, obtained from the cross Kawvale x Tenmarq, has shown considerable tolerance to Hessian fly attack. Under field conditions resistance obtained from Marquillo has behaved as a recessive factor in the *F*<sub>1</sub> generation, while that derived from other spring wheats has shown dominance. Hybrids involving Marquillo have been back-crossed to winter

wheats and are now being tested in yield trials; as seedlings some selections have exhibited satisfactory resistance to leaf rust and Hessian fly. Resistance to Hessian fly has now been transferred from several other spring wheats to winter wheat hybrids. Certain of these compound hybrids have given a much higher degree of resistance than the hybrids involving Marquillo.

The objectives of future work include (1) the combination of the highest level of fly resistance and disease resistance, especially the resistance to stem rust derived from Hope, in a commercial wheat with high test weight and quality; (2) the possible combination of the different genes for fly resistance in one hybrid; and (3) an examination of fly resistant strains derived from introductions to find new genes for fly resistance and other valuable characters.

253. IKEDA, T. 633.11:664.641.016(52)  
**(Breeding wheat varieties for bread making).**

Bot. and Zool. 1939 : 7 : 219-26.

Flour quality is discussed from the standpoint of its relation to hardness of the wheat used and to gluten content.

The latter property, a genetic character, must be determined by a study of several generations (from  $F_3$  and onwards), with due allowance for environmental influences.

Data showing gluten content and hardness are recorded for a number of Japanese varieties of wheats in Sapporo and other localities.

Methods of estimating the properties of flour are discussed.

254. ROBERTS, T. C. 633.11:664.641.016(77.6)  
**Wheat and flour quality requirements.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 33-36. (Mimeographed).

The requirements by the milling industry with respect to the various aspects of varietal quality are discussed. The conclusions reached at General Mills Incorporated relating to the qualities of hard red winter wheats include the following: (1) in general, certain varieties stand out as satisfactory or unsatisfactory for use in mill blends; (2) varieties possessing quite different and distinctive characteristics are commercially valuable when suitably used, provided only that their baking quality is good within the general limits of commercial practice; (3) the variety Chiefkan, Superhard Blackhull or Red Chief have not been found to meet the requirements of any flour type and their presence in blends in any appreciable amount depreciates the quality.

255. PENCE, R. O. 633.11:664.641.016(78.1)  
**Summary of the milling of 1944 U.S.D.A. samples.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 40. (Mimeographed).

A brief report is given of the results of tests to evaluate the milling qualities of wheat varieties for use in blends.

256. ROBERTS, T. C. 633.11:664.641.016:575(77.6)  
**Milling and baking research in relation to wheat breeding.**  
 3. Trends in commercial milling and baking practices and their probable effects upon wheat quality requirements.

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 17-19. (Mimeographed).

Trends in commercial milling and baking practice and nutritional requirements are discussed in relation to their possible effect upon the future objectives of the wheat breeder.

257. AUSEMUS, E. R. 633.11:664.641.016:578.08(77.6)  
**Wheat meal fermentation tests with hard red spring wheats.**

Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 22. (Mimeographed).

Hard red spring varieties and hybrid progenies were subjected to the wheat meal fermentation test during the period 1938-1940 in Minnesota. Differentiation between varieties showing wide differences in breaking strength was possible, but a more precise test is necessary to differentiate within a group of varieties of high quality.

258. FIFIELD, C. C. 633.11:664.641.016:578.08(77.6)  
**Objectives in quality testing of varieties by the U.S. Department of Agriculture, Beltsville, Maryland.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 9-13. (Mimeo graphed).  
The methods used by the United States Department of Agriculture, at Beltsville, in evaluating the different milling and baking qualities of wheat varieties are discussed.

259. FIFIELD, C. C. 633.11:664.641.016:578.08(77.6)  
**A summary of the collaborative study of test baking procedures by the Minnesota, North Dakota and U.S.D.A. Laboratories.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 13-16. (Mimeo graphed).  
The flour of eight varieties of spring wheat was tested at eight different laboratories by several baking methods. With the exception of the varieties Merit and Premier, which were uniformly and generally low in loaf volume, respectively, the relative evaluation of the varieties showed marked dependence upon the methods and formulae used.

260. GEDDES, W. F. 633.11:664.641.016:578.08(77.6)  
**Milling and baking research in relation to wheat breeding. 1. Objectives in the quality testing of wheat samples.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 5-7. (Mimeo graphed).  
The problems of varietal sampling are discussed, emphasis being laid upon the need for commercial tests of the various properties affecting quality in addition to experimental tests.

261. HARRIS, R. H. 633.11:664.641.016:578.08(77.6)  
**Milling and baking research in relation to wheat breeding. 2. Studies and methods used in attaining objectives.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 7-8. (Mimeo graphed).  
An account is given of the methods used for testing milling and baking qualities in the breeding programme of the North Dakota Experiment Station.

262. MERRITT, P. P. 633.11:664.641.016:578.08(77.6)  
**The Minnesota Station milling and baking methods and the philosophy for using them.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 8-9. (Mimeo graphed).  
The methods of testing, milling and baking characteristics in the wheat breeding programme of the Minnesota Experiment Station are described.

263. SULLIVAN, B. 633.11:664.641.016:578.08(77.6)  
**Milling and baking research in relation to wheat breeding. 4. Quality characteristics of an ideal hard red spring wheat.**  
Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 19-21. (Mimeo graphed).  
The industrial milling and baking requirements of wheat varieties are discussed, with particular reference to methods of sampling and the relationship between the results of experimental and commercial tests.

264. FINNEY, K. F. and BARMORE, M. A. 633.11:664.641.016:578.088(73)  
**Varietal responses to certain baking ingredients essential in evaluating the protein quality of hard winter wheats.**  
Cereal Chem. 1945 : 22 : 225-43.  
The effect of mixing time on leaf volume and grain score of bread have been determined at several levels of potassium bromate and for each of three years in several varieties of hard red winter wheat and one variety of hard red spring wheat, with the object of ascertaining which formulae and methods are satisfactory for the evaluation of new varieties as sources of bread flour.

265. REED, E. W. 633.11:664.641.016:578.088(78.1)  
**Need for additional research from the standpoint of the miller and baker.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 46-51. (Mimeographed).  
 The need is stressed for the development of quick and accurate methods of commercial grading of wheat varieties.

266. SHELLENBERGER, J. A. 633.11:664.641.016:578.088(78.1)  
**Problems in evaluating quality.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 37. (Mimeographed).  
 Emphasis is laid upon the desirability in future work of evaluating varietal properties such as toasting quality, staling rate and blending characteristics, and upon the need of research on the fundamental nature of the characteristics of quality.

267. FINNEY, K. F. 633.11:664.641.016:577.088:575.42(77.1)  
**Water remaining hydrated against centrifugal force as an index of the protein quality of hard wheats.**  
 Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : 38-39. (Mimeographed).  
 A description is given of the hydration test for estimating protein quality in hard wheats, which in conjunction with tests for other important properties of the wheat and flour, is considered to be particularly valuable in the early stages of breeding work, when only limited amounts of material are available for milling and baking tests.

268. CLARK, J. A. 633.11.00.14  
**Agronomic aspects of hard spring wheat breeding. 4. Results from uniform regional nurseries, 1932 to date.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : p. 46. (Mimeographed).  
 A survey is given of the different varieties and hybrid strains used as uniform varieties in the co-operative regional nursery tests carried out since 1932.

269. CLARK, J. A. 633.11.00.14(77.6)  
**Agronomic aspects of hard spring wheat breeding. 2. Results of uniform varieties in plot experiments, 1929 to date.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 43-45. (Mimeographed).  
 Data are given of the different hard red spring wheat and durum varieties comprising the uniform variety tests in the plot experiments carried out at the co-operating stations in several states since 1929.

270. PUTNAM, H. O. 633.11.00.14:664.641.016(77.6)  
**Report of milling and baking results by the Northwest Crop Improvement Association. Wheat Variety Committee and Plant Breeders Meeting.**  
 Rep. Mill. Baking Mtg, 7th Hard Spring Wheat Conf., Minneapolis, Minn., February 28 and 29—March 1, 1944 : 1-3. (Mimeographed).  
 The results of the milling and baking tests of the following varieties are discussed: Mida, New-thatch, Regent, Henry, Vesta, No. 1520, No. 1597 (Merit x Thatcher), and of the Montana winter wheats, Yogo, Karmont, and Cache (Ridit x Utah Kanred).  
 Varietal recommendations are made for the plots for the 1944 milling and baking tests.

271. POEHLMAN, J. M. and BOWMAN, F. 633.11.00.14:664.641.016(77.8)  
**The production of quality in Missouri soft wheat.**

Bull. Mo. Agric. Exp. Sta. 1945 : No. 487 : Pp. 15.

The recently developed soft varieties, Early Premium and Clarkan, have given satisfactory results in chemical analyses of the wheat and flour, baking tests, and various tests to determine additional properties of the gluten. The general inferiority in quality of the semi-hard variety Kawvale was demonstrated.

272. JOHNSON, J. A. 633.11.00.14:664.641.016(78.1)  
**Summary of baking quality of certain new varieties.**

Report of the Fifth Hard Red Winter Wheat Improvement Conference, Manhattan, Kansas, February 12, 13 and 14, 1945. Div. Cereal Crops Dis., Plant Ind. Sta., Beltsville, Md 1945 : p. 41. (Mimeographed).

The baking quality of new varieties of wheat has been compared with that of varieties established as sources of flour for white bread production. The three varieties graded lowest for protein quality were Early Blackhull, Blackhull x Cheyenne (C.I. 12101) and Cheyenne x Tenmarq (C.I. 11972), and the three varieties graded highest were Kharkof, Westar and Quivira x Tenmarq (C.I. 12116). All the 15 varieties tested exhibited satisfactory scores for bread grain and colour, and all with the exception of Blackhull x Cheyenne had satisfactory mixing quality.

273. HARRIS, R. H., WALDRON, L. R. and SIBBITT, L. D. 633.11.00.14:664.641.016(78.4)  
**Comparative yields and quality data for five hard red spring wheat varieties as affected by growth location.**

Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1945 : 7 : No. 5 : 8-11.

In tests of five varieties at eighteen locations in 1944 both variety and location significantly affected yield per acre and baking quality.

274. CUGNAC, A. DE, and BELVAL, H. 633.11A *Aegilops*:575.127.5:581.192  
**Identification de la lévosine (lévoholoside) dans l'extrait glucidique soluble des grains d'un *Aegilops*. (Identification of laevisin (laevotholoside) in soluble carbohydrate extract of grains of an *Aegilops*).**

Bull. Soc. Bot. Fr. 1940 : 87 : 97-101.

This laevisin in *Aegilops* proved identical with that hitherto only found in rye, wheat and barley, thus demonstrating a new chemical affinity between these genera, which are capable of inter-generic crossing to produce fertile hybrids.

### OATS 633.13

275. Å....., Å. 633.13:575(48.5)  
Ett par försök med Bøtøhavre. (A few experiments with the Bøtø oat).  
Sverig. Utsädesfören. Tidskr. 1945 : 55 : p. 147.

This new yellow-grained oat, frequently mentioned a few years ago in the Danish press, was tested in 1943 and 1944 at Svalöf, Guldregn (Golden Rain) II being chosen for comparison. The Bøtø oat proved inferior to Guldregn II in strength of straw and hectolitre weight. Danish opinion of Bøtø also appears to be changing somewhat.

276. ÅKERMAN, Å. 633.13:575(48.5)  
Nya erfarenheter rörande Samehavrens odlingsvärde. (New findings as regards the cultivation value of the Same oat).  
Sverig. Utsädesfören. Tidskr. 1945 : 55 : 101-08.

Information is given on yield trials, time of ripening, quality of grain and strength of straw, with an exact description, provided by the State Seed Control Institute, of the characteristics of the new oat. Its economic value for Norrland is shown to be very considerable (cf. also *Plant Breeding Abstracts*, Vol. XIII, Abst. 496).

277. COFFMAN, F. A.,  
 HEYNE, E. G.,  
 JOHNSTON, C. O.,  
 STEVENS, H. and  
 MURPHY, H. C. 633.13:575(73)  
**Improvement and distribution of spring-sown red oats.**  
 J. Amer. Soc. Agron. 1945 : 37 : 479-98.

The detailed history is given of the work of selecting and breeding varieties for the regions in which spring-sown red oats are grown, since its beginning 25 years ago. Varieties are now available which are high yielding, fairly satisfactory in plant and grain characters, and resistant to the most common races of rust and smut, such as the disease resistant, early maturing varieties Boone, Cedar, Tama, Vicland and Ventura, derived from the cross Victoria x Richland, and Fultex, derived from the cross Victoria x Fulghum. Present work has as its objectives the improvement of strain quality, increase in bushel weight, and resistance to new races of stem and leaf rusts and smut.

278. FRIEDBERG, R. 633.13:582:578.088(44)  
**Les avoines cultivées en France. (The oats cultivated in France).**  
 Centre Nat. Rech. Agron. Paris, Imprimerie Nationale 1942 : Pp. 172.

A review is given of the schemes proposed for the classification of cultivated oats and this is followed by a description of the various criteria used to distinguish between varieties. The remainder of the paper is devoted to detailed descriptions of the principal varieties, mention being made of their genetical origin, grain and inflorescence characters, vegetative development, maturation time, resistance to lodging and disease resistance. Figures accompany the descriptions, and keys for identification are provided.

279. HANSING, E. D.,  
 HEYNE, E. G. and  
 MELCHERS, L. E. 633.13-2.451-1.521.6:575.12(78.1)  
**Studies on smut-resistant oats for Kansas.**  
 J. Amer. Soc. Agron. 1945 : 37 : 499-508.

The work carried out since 1916 to develop smut resistant varieties is described in detail. Recent work has resulted in the development of two new varieties, Osage and Neosho, approved for distribution in Kansas in the spring of 1945. Osage has been selected from the cross Fulton x (Victoria x Richland), Neosho from the cross (Fulghum x Markton) x (Victoria x Richland). Osage shows intermediate susceptibility to the races of smut differentiated by the variety Fulton, and resistance to the races differentiated by Fulghum and Richland; Neosho is highly resistant to these races. Both varieties exhibit resistance to the common races of crown and stem rusts.

280. MOORE, M. B.,  
 HAYES, H. K. and  
 STAKMAN, E. C. 633.13-2.452:576.16:631.521.6(73)  
**The field reactions of certain oats hybrids and varieties to stem rust.**  
 Phytopathology 1945 : 35 : 549-51.

Until 1943 selected lines from crosses between Bond and each of the varieties Rainbow, Iogold, Anthony and two lines designated "Double Cross" A and B derived from the cross (Minota x White Russian) x Black Mesdag, showed resistance to stem rust. In 1943, however, large and small pustules were observed on the majority of lines from the crosses Bond x Rainbow and Bond x Iogold. All the lines of Anthony or "Double Cross" parentage showed partial or complete resistance, only the small pustules characteristically produced by the common races 2 and 5 being formed. On 22 out of 25 lines of Rainbow or Iogold parentage both large and small pustules were observed. Race 8 was identified in collections from lines and varieties having Rainbow, Iogold or Richland as one parent; collections from lines derived from Anthony and "Double Cross" consisted mainly of race 2. The resistance of the hybrids derived from Anthony and "Double Cross" is traceable, it is presumed, to their White Russian parentage.

281. MÜNTZING, A.

**Cytological studies of extra fragment chromosomes in rye. II. Transmission and multiplication of standard fragments and iso-fragments.**  
Hereditas, Lund 1945 : 31 : 457-77.

The investigation of a number of crosses within the variety Östgöta Gråråg involving plants with standard extra chromosome fragments has shown that these fragments undergo an almost regular post-meiotic non-disjunction in both the developing ovule and pollen grain, resulting in the doubling of the fragment number. The inheritance of small and large iso-fragments, derived from the long and short arms of the standard fragment, was studied in various combinations. The large iso-fragment was found to possess the same ability of post-meiotic non-disjunction as the standard fragment; the small iso-fragment, however, showed no such disjunction.

Standard chromosomal fragments in the variety Vasa II were found to resemble those in Östgöta Gråråg and in Russian and Japanese varieties with regard to type and non-disjunction.

## MAIZE 633.15

282. GRANER, E. A.

**The yellow-orange endosperm of maize.**  
Amer. Nat. 1945 : 79 : 187-92.

A general account is given of the genes determining carotenoid pigmentation in the endosperm and aleurone layer of maize. Investigation into the several colour intensities displayed by stocks carrying genes  $Y_1$  and  $Y_2$  are explained by the assumption of modifying genes, and there is evidence that the difference between orange and yellow pigmentation is the result of a single gene pair. A new gene  $Y_5$  determining pale yellow endosperm pigmentation in the presence of  $Y_1$  has been isolated from the Brazilian strain Cateto. The genes controlling aleurone pigmentation in Brazilian varieties are believed to be alleles of  $Bn_1$ , and to be affected also by modifiers.

283. RICHEY, F. D.

633.15:575.14:575.42:575.12(73)

**Isolating better foundation inbreds for use in corn hybrids.**  
Genetics 1945 : 30 : 455-71.

The methods used by previous workers in studying correlation between the characters of inbred lines and those of their hybrids are critically examined; the view is expressed that the yields of the  $S_3$  and  $S_4$  generations provide better criteria of combining ability than has been generally accepted.

The data of Jenkins (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 546) from which the conclusion is reached that inbred lines acquire their individuality as combiners in top-crosses after the first or second generation of selfing, the early testing of inbreds thus being possible, are re-analysed, and it is considered that this conclusion is invalid.

A hypothesis of the mode of operation of genes determining yield in maize is presented, the essentials of which are as follows: (1) Quantitative characters are determined by a large number of genes having small and more or less equal effects, and lacking dominance; (2) genes determining vigour are in the category of dominant and recessive genes, the dominant factors being more favourable to growth than the recessive alleles; (3) the individual recessive genes differ in effect, ranging from the order of lethals or semi-lethals to recessives of the lowest order which are only slightly less favourable to growth than their dominant alleles; (4) the frequency of particular recessives in open-pollinated maize is inversely related to their degree of deleteriousness; and (5) linkage severely limits the independent recombination of factors. The problem of securing superior inbred lines is regarded primarily as one of isolating inbreds carrying the largest complement of growth favourable genes, and the correlations between the performance of the inbreds *per se* and in hybrid combination are considered to indicate the most probable source of high yielding hybrids.

The various problems of selection are discussed in relation to the hypothesis, and a breeding programme based upon these principles is outlined. This programme is termed "cumulative selection", and comprises (1) preliminary visual selection of individual plants in the selfed progenies, (2) testing for combining ability after the  $S_4$  or  $S_5$  generation by the method of top-crossing or series of single crosses, (3) crossing the inbreds showing high combining ability, and (4) a second cycle of selective inbreeding.

284. SASS, J. E. and GREEN, J. M. 633.15:576.356.5:581.04  
**Cytohistology of the reaction of maize seedlings to colchicine.**  
 Bot. Gaz. 1945 : 106 : 483-88.

Maize seedlings have been treated with colchicine with the resultant production of polyploid sectors. This effect, however, is accompanied by various morphological and mitotic aberrations which are described and figured.

285. ALFARO, A. C. 633.15:581.143:575.116.1  
 Un nuevo carácter adherente en maíz. (A new adherent character in maize).  
 An. Inst. Fitotéc. Santa Catalina 1942 : 4 : 28-39.

A new "adherent" character in maize is described which brings about a tendency for coalescent growth affecting the leaves and the inflorescences. It is determined by a single recessive gene *ad*<sub>z</sub> which is linked neither with the series *Ts*<sub>2</sub>-*P*-*Br*-*F*<sub>1</sub>-*Bm*<sub>2</sub> in chromosome 1, nor with the series *Su*<sub>1</sub>-*Tu*-*Gl*<sub>3</sub> in chromosome 4.

286. JONES, D. F. 633.15:581.143:575.242:575.41  
**The importance of degenerative changes in living organisms.**  
 Science 1945 : 102 : p. 209.

It is pointed out that, although maize mutations affecting growth rate in inbred material are usually deleterious when homozygous, yet they may have a positive selection value when heterozygous.

287. PERRY, H. S. 633.15:581.162.3:575.11:581.6(73)  
**The *Ga* gene as a means of reducing contamination of sweet corn.**  
 J. Hered. 1945 : 36 : 131-34.

The Gene *Ga*, causing selective fertilization, has been substituted for the recessive allele *ga* in one of the parents of the hybrid Golden Cross Bantam, to produce an *F*<sub>1</sub> genotype with pollen grains heterozygous for *Ga*. The presence of *Ga* has been found to eliminate about 75% of the naturally occurring contamination by wind-borne pollen from starchy corn, and, although supporting statistical data are not available, the view is expressed that effectiveness in reducing contamination increases as the concentration of pollen grains bearing *Ga* increases.

288. RIFE, D. C. 633.15:581.48:575.242:575.11.061.6  
**A mutation in corn pericarp.**  
 Ohio J. Sci. 1944 : 44 : 143-44.

An ear of maize occurred which contained kernels with a red pericarp among the yellow kernels. The unexpected behaviour of plants grown from the yellow kernels indicated that the plant bearing the red colour variant must have been heterozygous for the genes *P*<sup>wr</sup> and *P*<sup>vv</sup> determining colourless and variegated pericarp, respectively, and that a mutation of the recessive gene *P*<sup>vv</sup> to the dominant allele *P*<sup>wr</sup> for red pericarp colour had occurred.

289. SASS, J. E. 633.15:581.48:578.6  
**Schedules for sectioning maize kernels in paraffin.**  
 Stain Tech. 1945 : 20 : 93-98.

A technique for the paraffin sectioning of maize kernels is described. The method is also applicable to tough old stems of corn and hemp, and possibly to many caryopses and seeds.

290. HUBER, L. L. 633.15-1.543(73)  
**Thin stands of corn produce bigger ears but lower yields than thicker plantings.**  
 Suppl. No. 2, Bull. Pa. Agric. Exp. Sta. No. 464 : p. 10.

Data are given emphasizing the importance of using the optimum planting rate for a given level of soil fertility. It is pointed out that the increase in yields obtained as a result of growing hybrid instead of open-pollinated varieties may be cancelled by the use of unsuitable planting rates.

291. VALLEGA, J. 633.15-2.452:576.16:631.521.6(82)  
Observaciones preliminares sobre especialización fisiológica de *Puccinia sorghi*,  
en Argentina. (Preliminary observations on physiological specializa-  
tion of *P. sorghi* in Argentina).  
An. Inst. Fitotéc. Santa Catalina 1942 : 4 : 14-16.

Two physiological races, A and B, have been distinguished within the rust species *P. Sorghi* Schw. Race A produces a type O (necrotic) reaction on the maize strain 41.3040, while race B is described as highly virulent.

292. JOHANN, H. and 633.15-2.482-1.521.6:581.1  
DICKSON, A. D.  
**A soluble substance in cornstalks that retards growth of *Diplodia zeae* in culture.**  
J. Agric. Res. 1945 : 71 : 89-110.

The presence in maize stalks of an ether or sap soluble substance retarding the growth of *Diplodia Zeae* has been investigated in 11 inbred lines and five single crosses. The juices and ether extracts of stalks harvested before or shortly after pollination were found to retard the growth of the fungus in culture to a greater degree than those from stalks of more mature plants. Certain lines, however, retained more of the growth-retarding substance during maturation of the ears than others, thus exhibiting a physiological type of resistance. Strong stalk and root system were not necessarily associated with high physiological resistance. Seasonal differences in physiological resistance were observed. It is suggested that differences in susceptibility are due to differences in the rates of the plant development and the corresponding disparity in the amount of the growth-retarding substance, rather than to radical physiological differences.

293. ELLIOTT, C. and 633.15-2.484-1.521.6(73)  
JENKINS, M. T.  
***Helminthosporium turcicum* leaf blight of corn.**  
Phytopathology 1945 : 35 : p. 485. (Abst.).

Most inbred lines, single and double crosses of dent corn have shown susceptibility to leaf blight in field inoculation tests during 1944 at Beltsville, Maryland. Certain inbreds, however, showed only slight infection. In general, the relative resistance of these lines was evident in their hybrids.

294. PATCH, L. H. and 633.15-2.7-1.521.6:575.14:575.12(73)  
EVERLEY, R. T.  
**Resistance of dent corn inbred lines to survival of first-generation European corn borer larvae.**  
Tech. Bull. U.S. Dep. Agric. 1945 : No. 893 : Pp. 10.

In a previous bulletin the results of tests of the reaction of several strains as inbred lines and in hybrid combinations to attack by European corn borer larvae was reported (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 172). The present paper gives the data obtained from extended tests of additional lines carried out during the period 1938-41.

Inbred lines of unknown reaction to borer attack were tested against groups of standard inbreds of known resistance or susceptibility. A total of 37 strains were also tested both as inbreds and in hybrid combination with common parents. A significant correlation was obtained between the reaction of the lines as inbreds and hybrids.

In a comparison of inbreds of previously established resistance and susceptibility and their single-cross hybrids, when hand-infested with 120 eggs per plant, the hybrids averaged 1.86 fewer borers per plant than the corresponding inbreds, in spite of the fact that the hybrids were on the average 7.1 days earlier in silking.

The reaction to borer attack of six commercial double-cross hybrids widely grown in the Corn Belt was compared with that of some of the most highly resistant and susceptible experimental single-cross hybrids. The group of commercial hybrids showed approximately half the borer resistance of the resistant group of single-crosses.

**Large scale barley variety experiments.**

J. Dep. Agric. Eire 1945 : 42 : 99-105.

The results are reported of (1) extensive trials of the three varieties Spratt-Archer 37 No. 3, Spratt-Archer 37 No. 3 x Victory 2 and Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2; (2) a small-scale yield and malting trial of eight varieties, comprising Spratt-Archer 37 No. 3, Spratt-Archer 37 No. 3, selection No. 7, Spratt-Archer 37 No. 3 H.9 x Hybrid 4 B.1 No. 1, Beaven's 54/12/3 (a broad-eared barley from the cross Spratt-Archer x Plumage Archer), and hybrids between various selections of Spratt-Archer and Golden Archer; and (3) half drill strip experiments in which Spratt-Archer 37 No. 3 was tested against Beaven's 54/12/3 and Spratt-Archer 37 No. 3 against a broad-eared selection from the cross Spratt-Archer 37 No. 3 H.9 x Hybrid 4B1.

296. HAYES, H. K.

633.16:575(73)

**Barley varieties registered, X.**

J. Amer. Soc. Agron. 1945 : 37 : p. 645.

A description is given of the new variety Reno, the chief variety of winter barley grown in Kansas. It has been produced from selected heads of the adapted strain known as "South-central". It is a six-rowed, lax-headed, strong awned barley, and is the most winter hardy and highest yielding of the winter barleys tested in Kansas.

297. RIGONI, V. A.

633.16:578.088

Aplicación del fenol y otros reactivos en la identificación de variedades agrícolas de cebada, avena y centeno. Manifestaciones de fluorescencia en cebada y avena. (Application of phenol and other reagents in the identification of agricultural varieties of barley, oats and rye. Manifestations of fluorescence in barley and oats).

"Granos" Semilla Selecta, B. Aires 1943 : 7 : Nos 1-3 : 3-22.

The phenol coloration of the grain of a number of forage barley varieties was constant regardless of differences in provenance and year and is regarded as a useful diagnostic character. Of the five malting barleys tested all but one gave the same coloration. Some of them could be distinguished however by the coloration of the hulls when removed from the caryopsis.

Less satisfactory results were obtained with reagents such as guaiacol, *p*-cresol and catechol. Other reagents tested gave no constant differences.

In oats no differences were detectable between the varieties studied by the use of phenol or any of the other reagents.

In rye the percentage of grains which remained uncoloured after phenol treatment was different for different varieties. Similar results, though less reliable, were obtained with tyrosine.

298. POPE, M. N.

633.16:581.192:581.4:581.46(73)

**Ash content of barley plant parts when grown on two different soils.**

J. Amer. Soc. Agron. 1945 : 37 : 582-83.

An analysis of ash content of various plant parts has been made in Wisconsin Winter (C.I. 2159) and Esau (C.I. 4690) when cultivated on loamy upland and alluvial lowland soils. Varietal differences in percentage ash content were observed, and within each variety differences due to soil type. A definite relationship was shown between high ash content of awns and deciduousness of awns, the latter character promotes clean threshing.

299. ÅBERG, E.,

WIEBE, G. A. and

DICKSON, A. D.

633.16:581.192:581.46(73)

**Ash content of barley awns and kernels as influenced by location, season, and variety.**

J. Amer. Soc. Agron. 1945 : 37 : 583-86.

The ash contents of awns and kernels have been determined in two winter varieties and several spring varieties grown at different localities. Marked differences in ash content of awns due to environment were found in the winter barleys, Tennessee Winter 52 and Kentucky 1, both varieties showing similar differences. The ash content of the awns of the spring barleys varied considerably with location, and distinct varietal differences were also found. In the ash content of the kernels of both the winter and spring varieties, no large variations were observed due to location or variety. An analysis of ash content in two pairs of sister hybrid strains differing in

deciduousness of awns showed small differences in ash percentage, and although the greater the proportion of deciduous awns the higher the ash content, no close relationship between ash content and deciduousness of awns was established.

300. BERGAL, P. and FRIEDBERG, L. 633.16:582:578.088(44)  
Essai d'identification des orges cultivées en France. (**Study on the identification of the barleys cultivated in France**).  
Ann. Épiph. Phytoph. 1940 : 6 : 157-306.

A valuable taxonomic account is given of the principal French barleys. An introductory section deals with the various criteria used to discriminate between varieties, both morphological and physiological characters being considered. Detailed descriptions of the individual varieties follow, the forms being arranged under the following taxonomic units: *Hordeum hexastichum* L. vars *pyramidalatum* Kcke, *parallelum* Kcke, *pallidum* Kcke and *coeleste* L., and *H. distichum* L. vars *zoecritum* L., *erectum* Schubl., *nutans* Schubl. and *nudum* L. Under each variety, an account is given of its genetic origin, the form of the awns, glumes, rachis and grain, vegetative characters, maturation time, resistance to lodging, and disease resistance. Keys are provided to assist in the identification of the forms described.

301. TAPKE, V. F. 633.16-2.451.2:576.16:631.521.6(73)  
**Occurrence and distribution of physiologic races of *Ustilago hordei* in the United States.**

Phytopathology 1945 : 35 : p. 489. (Abst.).  
In an investigation of over 400 collections from 33 states, 13 physiological races of *Ustilago Hordei* have been identified by means of the following differential varieties, Excelsior, Hannchen, Himalaya, Lion, Nepal, Odessa, Pannier and Trebi. Races 1, 5 and 6 comprise 86.5% of the total collections.

302. YU, T. F. and FANG, C. T. 633.16-2.451.2:576.16:631.521.6(73)  
**A preliminary report on further studies of physiologic specialization in *Ustilago hordei*.**

Phytopathology 1945 : 35 : 517-20.  
A total of 14 varieties were inoculated with collections of *Ustilago Hordei* mostly obtained in south-west China. Nine physiological races were distinguished, the following varieties being used as differential hosts, Nanking Nos 368 and 373, Himalaya (C.I. 1312) and Excelsior (C.I. 1248).

### MILLETS AND SORGHUM 633.17

303. MARTIN, J. H. 633.174:575(73)  
**Breeding sorghums for social objectives.**  
J. Hered. 1945 : 36 : 99-106.

The social value of plant breeding is stressed. An account is given of the achievements in sorghum breeding in the United States since the first world war, which include the successful breeding of the following types: varieties resistant to *Pythium* root rot, chinch bug attack or lodging; early maturing and drought resistant grain sorghums for the northern States; sorghums for combine harvesting; palatable white and yellow seeded varieties for livestock; more easily hand harvested and improved dwarf broomcorn adapted to the sub-humid regions; a broomcorn with hardly any fuzz to the chaff which eliminates the discomfort of "broomcorn itch" during harvesting; and finally non-yielding types for the sole purpose of soil conservation.

### RICE 633.18

304. KIRIČENKO, K. S., DŽULAI, A. P. and KOSENKO, I. S. 633.18(47)  
(**The cultivation of rice in the province of Krasnodar**).  
Kraevoe Knigoizdateljstvo (Provincial Publishing House) Krasnodar 1939 : Pp. 60.

The main requirements of rice cultivation are briefly described in this booklet. One section deals with varieties and the production of seed but the technique of rice breeding is not discussed.

I. Z.

305. FUKE, Y.

(Improvements of lowland varieties).

Bot. and Zool. 1939 : 7 : 202-10.

633.18:575.12(52)

The results of lowland rice breeding in Japan are summarized and the yields, quality and other characteristics are presented in tabular form with special reference to Norin Nos 1 to 11. Norin Nos 3, 4, 5 and 8 show yield increases of 16, 20, 17 and 10% respectively. Norin Nos 9 and 11 are noted for their early maturity. Norin Nos 1, 2, 5, 6 and 10 are also completely resistant to blast. The ancestry of the Norin varieties is given.

Progress in work in Japan and a few other countries on resistance to disease, cold and insect pests is briefly reviewed with reference in some cases to inheritance.

Yield studies by various workers are also referred to, including experiments with the cross of the Japanese varieties Kinai Late No. 33 x Rikuu-Kamenoo No. 4, the results of which suggested that yield is polymerically conditioned, though the number of main genes is relatively small.

Technique is also referred to, including Kondo's successful experiment on "mass emasculation" on the same lines as Jodon's warm water treatment. Kondo's technique offers a simple and effective method of hybridization.

306. LIN, CHENG YAO and

CHEN, SHIH KAI

633.18:581.143.26.035.1(51)

(Length of day and the growth of rice).

Fukien Agric. J. 1941 : 3 : 162-67; 1942 : 4 : 93-123.

Experiments were conducted in 1940 and 1941 at the Shao Wu experiment station of Fukien University. The following rice varieties were used, one early (July White), one medium (August White) and two late varieties (Hunan White and Spotted Husk). The experimental photoperiods were 5, 7, 9, 11 hours and a full natural day.

The results showed that the vegetative development and number of tillers were highest in an 11 hour day and decreased with shorter photoperiod. The percentage of fertile tillers was generally highest in plants subjected to a full day treatment. Plant height was proportional to the length of day in the late varieties. Results were not definite in the early and medium varieties. The optimum photoperiod for root development was a full day. That for stalk development was a full day for the late varieties but an 11 hour day for the early and medium. The number of leaves was not affected by the photoperiod but the size of the leaves was larger in the short day treatment.

The time of heading was not influenced by length of day in the early variety. In the medium variety heading was 11-16 days earlier in the short day treatment than in the full day. In the late varieties time of heading was 63-74 days earlier, i.e. about half of the total vegetative period. The time of ripening showed a parallel response. By suitable photoperiodic treatment all these varieties can be made to flower at the same time, thus making cross-pollination work possible.

T. C. Y.

307. LIN, CHEN YAO

633.18:581.162(51)

(Study on the blooming habit of early, late and medium varieties of rice).

Fukien Agric. J. 1941 : 3 : 1-24.

Blooming habit of rice was studied at the Fukien University experimental ground, Shao Wu, with the object of facilitating hybridization work. The rice varieties used were July Early (early), August White (medium) and Hunan White (late).

The time interval from the emergence of the head to blooming is about 30 hours in the early variety, 4-5 hours in the medium variety, 40-50 hours in the colourless and 24 hours in the coloured late varieties. Blooming begins from 6 a.m. to 12.30 p.m. and is most vigorous at 9 a.m. in the early variety. In the medium variety blooming occurs between 9 a.m. and 12 and is most vigorous at 10 a.m.; in the late variety blooming takes place between 8 a.m. and 12.30 p.m., and mostly between 9 and 10.30 a.m. The optimum temperature for blooming is 80°-90° F. and the optimum humidity 65-75%. Rain delays blooming through the lowering of temperature. Blooming is at a maximum on the third day from its initiation. The whole blooming period lasts 5-10 days. Flowers open first on the apical ends of the rachis and its branches and spread downward.

During blooming the bracts open for 29-60 minutes. The maximum angle of opening is 25°-32°. It is reached in 4-15 min. and lasts for 5-10 min. The closing of the bracts takes 20-45 min. As the bracts open the stamens grow rapidly and may reach 0.8-1.1 cm. in length. T. C. Y.

## FORAGE GRASSES 633.2

633.2/3(47)

308. SUSAROV, A. (Some species and varieties of perennial herbage plants for the dry south-eastern parts of the U.S.S.R.). Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 4 : 28-29.

*Onobrychis arenaria* is considered to be a more valuable crop than lucerne for cultivation in the dry black-earth region east of the Volga, since it gives higher yields and is suitable as green fodder. In the southern regions of black-earth and chestnut soils, lucerne is the more suitable crop. Blue and yellow varieties of lucerne and varieties of *Agropyron* are described and compared.

309. NILSSON-LEISSNER, G. 633.2/3:575(48.5)  
Några synpunkter på förädlingen av betesväxter. (Some views on the improvement of pasture plants). Sverig. Utsädesfören. Tidskr. 1945 : 55 : 164-73.

This discursive paper deals in detail with the following aspects of pasture plant improvement: methods of breeding and experimentation; aims, including yield, persistence, disease and drought resistance, early and late maturity, periodicity; "white clover tolerance" in grasses; quality, as expressed by protein and carotene content; palatability; seed production; the maintenance of achievements attained by breeding; and the raising of seed of pasture plants. No actual experiments are recorded.

310. HOLLOWELL, E. A. 633.2:575(73)  
Registration of varieties and strains of grasses, I. 633.264(73)  
J. Amer. Soc. Agron. 1945 : 37 : 653-54.

A brief account is given of the breeding and improvement of grasses in the United States since 1935, when intensive breeding programmes were inaugurated. Alta fescue, a variety of tall fescue, *Festuca elatior* L. var. *arundinacea* (Schreb.) Wimm., is described. The variety originated as a plant selection in 1923 and was distributed in 1934; it is superior to commercial meadow fescue for forage purposes.

311. HILL, H. D. and 633.2:576.353:576.312.35:578.088  
MYERS, W. M. A schedule including cold treatment to facilitate somatic chromosome counts in certain forage grasses. Stain Tech. 1945 : 20 : 89-92.

Treatment at low temperature of root tips of orchard grass and meadow fescue has been found to contract the somatic chromosomes, thus facilitating the determination of chromosome numbers.

312. HARDISON, J. R. 633.2-2.421.1:576.16:631.521.6:575.42(73)  
Specialization in *Erysiphe graminis* for pathogenicity on wild and cultivated grasses outside the tribe Hordeae. Phytopathology 1945 : 35 : 394-405.

Inoculations of 123 species and eight varieties of grasses belonging to 28 genera were made with eight cultures of *Erysiphe graminis* from grasses outside the tribe Hordeae. Seven of the cultures infected species outside the genus from which they were collected. Pathogenic specialization was demonstrated in *E. graminis* from *Avena*; no variety of *A. sativa* showed resistance in the present study. The variation in reaction to *E. graminis* exhibited between the collections of most species and between individual plants within a single species in many of the collections indicates considerable opportunity for selection for mildew resistance.

313. ANDERSEN, S. 633.21:575.127.2:582(48.9)  
*Poa supina* Schrad. paavist i Danmark (Bornholm). [*P. supina* Schrad. discovered in Denmark (Bornholm)]. Bot. Tidsskr. 1944 : 46 : 269-71.

Particulars of the incidence of *P. supina* in Denmark are given from existing records and original research. The differences between *P. supina* and *P. annua* are mentioned and the hybrid *P. annua* x *P. supina*, which is completely sterile, is described.

314. NIELSEN, E. L. 633.21:581.163:576.356  
**Cytology and breeding behavior of selected plants of *Poa pratensis*.**  
 Bot. Gaz. 1945 : 106 : 357-82.

A detailed account is given of the cytology and genetical behaviour of representative families of *P. pratensis* L. Information is presented on seed germinability, meiotic behaviour, the relation of amphimixis to apomixis, embryogeny, and the relation between cytological behaviour and morphological properties.

315. CAMUS, A. 633.22:582(56)  
**Sur quelques graminées. (On some Gramineae).**  
 Bull. Soc. Bot. Fr. 1940 : 87 : 82-84.

This paper deals with *Bromus* and *Dactylis* species. A new subspecies of the latter, *D. glomerata* L. subsp. *orientalis* A. Camus from Turkey, is described.

316. CUGNAC, A. DE and 633.23:581.192:576.16  
 BELVAL, H. Sur les affinités des genres *Agrostis* et *Apera* d'après leur constitution glucidique. (The affinities of the genera *Agrostis* and *Apera* according to their glycoside constitution).  
 Bull. Soc. Bot. Fr. 1944 : 91 : 1-3.

It is thought that the genera *Agrostis* and *Apera* are closely allied, since the former contains the glycoside phlein, while the latter contains a member of the related group of graminins.

317. CUGNAC, A. DE and 633.26:581.192:575.127.2  
 BELVAL, H. Recherches phylétiques sur le genre *Bromus*. IX. Glucides et affinités des Bromes et des Fétuques. (Phyletic researches on the genus *Bromus*. IX. Glycosides and affinities of *Bromus* and *Festuca*).  
 Bull. Soc. Bot. Fr. 1941 : 88 : 402-10.

The species of the genera *Bromus* and *Festuca* hybridize to a considerable extent *inter se* but intergeneric hybridization has not been effected; *Festuca* and *Lolium*, however, will form intergeneric hybrids. *Festuca* and *Lolium* contain a glycoside resembling phlein while *Bromus* is characterized by a laevorotatory glycoside with affinities to triticin. *F. gigantea* resembles the other species of *Festuca*, both in its hybridization behaviour and in its glycoside content.

318. CUGNAC, A. DE 633.262:575:582  
 Recherches phylétiques sur le genre *Bromus*. VIII. Une double reconstitution expérimentale, faisant revivre une variété éteinte, et ses conséquences systématiques. (Phyletic investigations on the genus *Bromus*. VIII. A double experimental reconstitution, bringing into existence again a variety that had died out, and its consequences from the systematic standpoint).  
 Bull. Soc. Bot. Fr. 1939 : 86 : 409-19.

Reciprocal crossing of *B. arduennensis* and *B. grossus* (var. *velutinus*) showed complete dominance of the latter species in the *F*<sub>1</sub>, while in the *F*<sub>2</sub> regular dihybrid disjunction resulted in the production of the two parental types with, however, the integument character exchanged, thus giving two new varieties, *B. grossus nitidus* and *B. arduennensis villosus*. The latter variety has been extinct for about 50 years.

The taxonomic significance of these results is considered.

319. CAMUS, A. 633.262:575.127.2  
 Un nouvel hybride du genre *Bromus*. (A new hybrid of the genus *Bromus*).  
 Bull. Soc. Bot. Fr. 1944 : 91 : 79-80.

A presumed hybrid between *B. sterilis* and *B. tectorum* is described; it was found growing in the company of the presumptive parents.

320. CUGNAC, A. DE and CAMUS, A. 633.262:575.127.2  
Recherches phylétiques sur le genre *Bromus*. XII. Un hybride interspécifique nouveau: *x* *Bromus Laagei* hyb. nov. = *Bromus tectorum* *x* *squarrosum*. (Phyletic researches on the genus *Bromus*. XII. A new interspecific hybrid: *x* *B. Laagei* hyb. nov. = *B. tectorum* *x* *squarrosum*). Bull. Soc. Bot. Fr. 1944 : 91 : 172-74.

The  $F_1$  interspecific hybrid obtained by inter-crossing *B. tectorum* and *B. squarrosum* is figured and described.

321. BELVAL, H. and CUGNAC, A. DE. 633.262:576.16:581.192  
Recherches phylétiques sur le genre *Bromus*. XI. Sur la valeur du genre *Ceratochloa* P.B. d'après la nature du glucide lévogyre du Brome de Schrader. (Phyletic research on the genus *Bromus*. XI. On the validity of the genus *Ceratochloa* P.B. in the light of the nature of the laevo-rotary glycoside of *B. Schraderi*). Bull. Soc. Bot. Fr. 1942 : 89 : 4-5.

Biochemical evidence is cited in favour of including *Ceratochloa* in the genus *Bromus*.

322. CUGNAC, A. DE and SIMONET, M. 633.262:576.312.35:576.16  
Recherches phylétiques sur le genre *Bromus*. X. Quelques nombres de chromosomes et leur signification phylétique et phylogénétique. (Phyletic researches on the genus *Bromus*. X. Some chromosome numbers and their phyletic and phylogenetic significance). Bull. Soc. Bot. Fr. 1941 : 88 : 513-17.

Descriptions are given of the chromosome configurations of the following species: (1) with  $n = 14$ , *B. arvensis* L., *B. squarrosum* L., *B. sterilis* L. and *B. tectorum* L.; (2) with  $2n = 28$ , *B. secalinus* L., *B. grossus* Desf., *B. arduennensis* Dmrt, *B. macrostachys* Desf., *B. adoensis* Mochst., and *B. madritensis* L.; (3) with  $n = 42$ , *B. rigidus* Roth. and *B. macrantherus* Hack.; and (4) with  $n = 56$ , *B. Gussonei* Parl. and *B. inermis* Leyss. These results are considered in the light of phylogenetic theories relating to the course of evolution in the genus *Bromus*.

323. HARDISON, J. R. 633.262-2.484-1.521.6(73)  
A leaf spot of tall fescue caused by a new species of *Cercospora*. Mycologia 1945 : 37 : 492-94.

A new species of *Cercospora* has been identified on *Festuca elatior* var. *arundinacea* (Schreb.) Wimm. in Kentucky, and named *C. Festucae* Hardison. Plants of *F. elatior* L. growing in the proximity showed no sign of infection but several plants intermediate in type between *F. elatior* and *F. elatior* var. *arundinacea* were susceptible.

324. CUGNAC, A. DE and CAMUS, A. 633.264:575.127.2:633.263:581.192  
Un *x* *Festulolium* expérimental nouveau: *Festulolium Colini* = *Lolium temulentum* *x* *Festuca pratensis*. (A new experimental *x* *Festulolium*: *Festulolium Colini* = *L. temulentum* *x* *Festuca pratensis*). Bull. Soc. Bot. Fr. 1944 : 91 : 16-19.

Figures and a description are given of the  $F_1$  hybrid of *L. temulentum* L. and *Festuca pratensis* Huds. The other intergeneric hybrids known between these two genera are listed, and it is concluded that their crossability, together with the presence in both of the glycoside phlein, indicates a close natural affinity.

325. BURTON, G. W. 633.266:575(73)  
Dallis grass seed sources.

J. Amer. Soc. Agron. 1945 : 37 : 438-68.

Significant differences have been observed between 24 strains in forage yield, resistance to anthracnose and ergot, self fertility, date of heading and longevity. The strains could be grouped into three distinct plant types. Most of the strains were closely similar and made up the common Dallis grass group. The second group contained leafier plants, D-1 and D-2,

which showed greater resistance to anthracnose. The third group consisted of plants with yellow anthers, which were less leafy than the other two types. All the plants within any single strain exhibited pronounced uniformity of plant type. The yellow-anthered strains from Uruguay were much more resistant to ergot than any of the other strains tested. The strains are to be further tested, with a view to developing a superior strain combining the ergot resistance and fertility of the Uruguayan strains and the characters of D-1 and D-2.

326. BENOIST, R. 633.282:582  
Une nouvelle espèce du genre *Andropogon*. (A new species of the genus *Andropogon*).  
Bull. Soc. Bot. Fr. 1940 : 87 : p. 340.

The Latin description of *A. Mocquerysii* nov. sp., found in Venezuela, is given.

327. JOHNSON, B. L. 633.285:576.312.35:582:001.4  
**Cyto-taxonomic studies in *Oryzopsis*.**  
Bot. Gaz. 1945 : 107 : 1-32.

A revision of the genus *Oryzopsis* Michx is proposed from a study of its cytological and morphological characteristics. It is thought that the basic chromosome number of *Oryzopsis* section *Piptatherum* and the related genus *Stipa* is  $x = 6$ ; a secondary basic chromosome number of  $x = 11$  characterizes *Oryzopsis* section *Euoryzopsis*. This latter chromosome number may have arisen through allopolyploidy between *Piptatherum-Stipa* forms with five and six chromosomes, and further allopolyploidy has probably given rise to *Oryzopsis* section *Eriocoma* and to the higher polyploids of the other two sections and of the genus *Stipa*. *O. Webberi* (Thurb.) Benth. is transferred to *Stipa*.

328. OLMSTED, C. E. 633.287:581.143.26.035.1(73)  
**Growth and development in range grasses. V. Photoperiodic responses of clonal divisions of three latitudinal strains of side-oats grama.**  
Bot. Gaz. 1945 : 106 : 382-401.

Marked differentiation in respect of photoperiodic adaptation has been observed in *Bouteloua curtipendula* (Michx) Torr. Strains from Texas were found to be short-day or intermediate forms; strains from North Dakota required long-day illumination; while clones from Oklahoma comprised both intermediate and long-day types.

329. BOYLE, W. S. 633.288:576.312.34:582  
**Cytological evidence for the taxonomic position of *Schizachne purpurascens*.**  
Madroño 1944 : 7 : 129-30.

It is recommended that the genera *Schizachne* and *Melica* be maintained distinct since the former has a complement of ten small chromosomes, little differentiated in size *inter se* and with median or submedian centromeres, while all the species of the latter so far studied have nine large chromosomes exhibiting marked differentiation in length and centromere position. Both genera, however, are assigned to the tribe Melicinae proposed by Skorniakov *et al.*

330. GOULD, F. W. 633.289:576.312.35:582(73)  
**Notes on the genus *Elymus*.**  
Madroño 1945 : 8 : 42-47.

Detailed descriptions are given of the three American species *Elymus condensatus* Presl., *E. cinereus* Schribn. et Merr. and *E. triticoides* Buckl., and their phylogenetic relationships are discussed. The following chromosome numbers are recorded: *E. condensatus*,  $2n = 28, 56$ ; *E. cinereus*,  $2n = 28, 56$ ; and *E. triticoides*,  $2n = 28, 42$ .

### LEGUMINOUS FORAGE PLANTS 633.3

331. HOLLOWELL, E. A. 633.31:575(73)  
**Registration of varieties and strains of alfalfa, I.**  
J. Amer. Soc. Agron. 1945 : 37 : 649-52.

The improvement and breeding programmes in the United States, begun some 30 years ago, are briefly reviewed. Descriptions are given of the varieties Ranger, Buffalo and Meeker Baltic.

Ranger is a new synthetic variety developed by compositing five strains. These strains were derived from inbred lines subsequently out-crossed among selected lines of Cossack, Turkestan and Ladak in the proportion of 45, 45 and 10% respectively. Ranger is adapted to the northern states; it is resistant to bacterial wilt (*Corynebacterium insidiosum*), and is winter hardy. The new variety Buffalo is a bacterial-wilt resistant selection from the variety Kansas Common. Mecker Baltic is a natural selection of Baltic, first distributed in 1932. It is susceptible to bacterial wilt; it is generally adapted to the northern and central states where wilt is not a factor in stand survival.

332. WESTOVER, H. L. 633.31:575(73)

**Alfalfa varieties in the United States.**

Fmrs' Bull. U.S. Dep. Agric. 1934 (revised 1945) No. 1731 : Pp. 17.

The commercial types of lucerne of the United States may be divided into four groups: (1) the common lucernes, including the domestic strains, and strains from Argentina, South Africa and Provence; (2) lucernes either directly or indirectly of Turkestan origin, which include the varieties Turkestan, Hardistan and Orestan; (3) the variegated varieties derived from crosses between common lucerne and the yellow-flowered species, for example Grimm, Ladak and Hardigan; and (4) the non-hardy group in which only the Peruvian lucernes have become commercially important. Descriptions are given of the various characters of the lucernes of these four groups, including adaptability, and of the new varieties Ranger, Buffalo, Atlantic and Nemastan.

333. LISICYN, P. and 633.321:581.192:575.42(47)  
FEDORČUK, V.

**(The relationship between the percentage of leaf and the contact of crude protein in red clover).**

Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. U.S.S.R.) 1945 : No. 3 : 3-11.

It is shown that plant breeders should not rely on the proportion of leaf to stem even as an approximate guide to the selection of the best forage clover plants, although it is agreed that the leaves contain about twice as much protein as the stems. It has been found that the content of crude protein in the leaf, stem and inflorescences is very variable, and in each varies independently. Only at the end of the flowering period does the correlation coefficient between the percentage of leaf and inflorescence together and the percentage of crude protein amount to + 0.5. On the whole the most reliable criterion is considered to be chemical analysis.

334. \*VORONJUK, B. A. 633.35:575(47)  
**(Botanical varieties of spring vetch and their productiveness).**

Trudy Zonaljnogo Inst. Zernovogo Hozjaistva Raionov Nečernozemnoj Polosy (Trans. Zonal Inst. Grain Husbandry Non-Black-Soil Districts) 1941 : No. 10 : 79-83.

A study has been made of populations of spring vetch from the provinces of Kursk, Orel, Tambov, Voronež and other regions, with the object of collecting material for breeding varieties suitable for cultivation in the northern parts of the zone of non-black-soil. The chief botanical varieties of *Vicia sativa* are described with regard to flower and seed coat coloration, and the distribution of some of the varieties is tabulated.

335. SKREPINSKIJ, A. I. 633.361.00.14(47)  
**(Experiments with sainfoin varieties).**

Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 1 : 28-30.

The yields of hay and seed of the following varieties of sainfoin were compared: *Onobrychis antasiatica*, Hybrid 2731, *O. arenaria* D.C. No. 1251, *O. sativa* Zam. No. 553, and Talyšskij 129. The lucerne, Grimm-Zaïkevič, was also included in the trials. The first three of the above varieties are recommended for cultivation west of the Volga in the region of Saratov. *O. antasiatica* gave the highest yield of hay, the hybrid 2731 gave the highest yield of seed.

\* An abridged translation of this paper is on file at the Bureau.

336. RINKE, E. H. 633.366:581.6:575.11<sup>b</sup>  
**Inheritance of coumarin in sweet clover.**  
 J. Amer. Soc. Agron. 1945 : 37 : 635-42.

Inbred lines of the Alpha and standard types of sweet clover, differing in coumarin content, were crossed, and studies of coumarin inheritance and growth habit were made by comparing the selfed progeny of the parent plants with the F<sub>1</sub> and F<sub>2</sub> generations. The mean coumarin content of the F<sub>1</sub> generation approximated to that of the parent with the low coumarin content, low coumarin content thus appearing to be dominant to high. F<sub>2</sub> ratios of plants with low content to plants with high indicate the possibility that a single major factor pair controls the inheritance of coumarin content. Within the range of coumarin content studied it was not found possible to determine accurately the content of second year growth by measuring the content of the first year's growth during July. Coumarin content was significantly influenced by environment, as shown by the data obtained from five F<sub>3</sub> families grown at three locations.

The F<sub>1</sub> plants from crosses between Alpha and standard growth types are of the standard type, indicating the dominance of standard over Alpha growth habit. A wide range of variation occurred in the F<sub>2</sub> population, which was grouped into four plant types. No genetic ratio was found for the F<sub>2</sub> segregation of the four groups based on different growth habit, probably on account of the difficulties of accurate classification. Growth habit and coumarin content were found to be inherited independently.

337. BAŽENOVA, M. 633.367:575(47)  
**(A sweet lupin variety).**  
 Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. U.S.S.R.) 1945 : No. 3 : 34-36.

The search for sweet lupins is described. Among several varieties mentioned, H-1, H-2 and 26-43 are especially recommended for multiplication on collective farms in the Brjansk province. The content of alkaloids in the seed was as low as 0.0069%; the grain and foliage yields and the time taken to reach maturity are considered satisfactory. I. Z.

338. MEITÈS, M. 633.367:581.481  
 Curieux cas de gémellité chez le Lupin blanc. **(A curious case of twinning in the white lupin).**  
 Bull. Soc. Bot. Fr. 1940 : 87 : p. 65.

Among 10,000 seeds of white lupin germinated in the course of five years' work on this plant, the author found one seed with four cotyledons, the development of which suggested that the duplication of organs, and the symmetry observed was due not to double fertilization but to fragmentation of the original fertilized egg cell.

#### ROOTS AND TUBERS 633.4

339. KOVERGA, A. 633.42:581.143.26.03  
**(The vernalization of forage turnip for purposes of seed production).**  
 Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin. Acad. Agric. Sci. U.S.S.R.) 1944 : Nos 11-12 : 42-48.

Seeds given about 47 days of vernalization treatment produce plants which bear seed in the first year. The progeny of these plants are normal biennials. Vernalization thus enables the maintenance of special seed plots, and allows storage of the roots to be eliminated. It is suggested that new varieties could be rapidly propagated by this method.

340. FOLSOM, D. 633.491:575:576.16(74.1)  
**Potato varieties : the newly named, the commercial, and some that are useful in breeding.**  
 Amer. Potato J. 1945 : 22 : 229-42.

Data have been collected on the origin, history and various characteristics of the chief older and more recent commercial varieties and of a number of varieties of interest as breeding material.

341. VAN DUYNE, F. O.,  
CHASE, J. T. and  
SIMPSON, J. I. 633.491:577.16  
**Effect of various home practices on ascorbic acid content of potatoes.**  
Food Res., Illinois 1945 : 10 : 72-83.

The mean values and standard deviations of the ascorbic acid content in peeled potatoes of the varieties Chippewa, Idaho, Irish Cobbler and Red Triumph have been determined, and the effect of several common cooking practices upon the ascorbic acid content of these varieties has been analysed.

342. SOSA-BOURDOUIL, C. 633.491:577.16:575  
Sur les baies de quelques solanées et leur teneur en acide ascorbique (Vitamine C). [On the berries of some *Solanaceae* and their ascorbic acid content (vitamin C)].

Bull. Soc. Bot. Fr. 1940 : 87 : 322-24.

Analysis of the fruits of four species of *Solanum*, including two varieties each of *S. Lycopersicon* and of *S. nigrum*, two varieties of *Capsicum annuum*, also *Atropa Belladonna* and *Physalis Alkekengi* showed that the vitamin C content is a specific character, and also a racial or varietal character within the species.

343. STEVENSON, F. J., 633.491-2.411.4-1.521.6:575(73)  
SCHULTZ, E. S.,  
AKELEY, R. V. and  
CASH, L. C.

**Breeding for resistance to late blight in the potato.**

Amer. Potato J. 1945 : 22 : 203-23.

The present programme of breeding varieties resistant to late blight was begun 12 years ago by the United States Department of Agriculture in co-operation with the Maine Agricultural Experiment Station. Some of the papers reporting progress at various stages of the programme are reviewed, and the results are brought up-to-date. In 1944, 12 selections related to the German W races were included in a yield test in Maine. The data indicate that some of the selections which seldom show infection under the most severe epidemics of the common forms of late blight give equal or higher yields than Green Mountain or Sebago, viz., B 67-11, B 70-5, B 73-2, B 73-10, B 188-9, B 188-61 and B 192-17. The tubers of several of these high-yielding selections are about as high in dry matter content as Green Mountain, B 67-11, B 70-5 and B 73-10 having the highest content. Very early, early, medium early and late varieties, possessing blight resistance, satisfactory yield and dry matter content, have been produced as a result of the programme.

344. TROUVELOT, B. 633.491-2.7-1.521.6  
Les phénomènes de résistance naturelle des plantes aux attaques des insectes et essai de leur utilisation pour la lutte contre le doryphore. (The phenomena of natural resistance of plants to insect attacks and the attempt to utilize them for the contest against the Colorado beetle).

Verh. VII Int. Kongr. Ent. 1939 : 4 : 2726-30.

A description is given of the nature of insect resistance as found in *Solanum* species, special attention being paid to the resistance shown by *S. demissum* to the Colorado beetle. Reference is made to the beetle-resistant properties of other *Solanum* species and to the use of *S. demissum* and these forms in breeding programmes.

345. TROUVELOT, B. and 633.491-2.7-1.521.6:575.127.2  
MÜLLER-BÖHME.  
Etude sur la valeur alimentaire, pour les larves du doryphore, d'hybrides *S. demissum* x *S. tuberosum*. (Study on the nutritive value, for the larvae of the Colorado beetle, of the hybrids of *S. demissum* x *S. tuberosum*).

Verh. VII Int. Kongr. Ent. 1939 : 4 : 2731-41.

Comparative data are presented of the feeding behaviour of Colorado beetle larvae on *S. tuberosum*, *S. demissum* and the hybrid plant 3545. In the last two cases, the larvae appear to suffer from loss of appetite.

346. CASAS, A. B. 633.492(72.91)  
 Las mejores variedades de boniato en Cuba. (**The best varieties of sweet potato in Cuba**).  
 Rev. Minist. Agric. Cuba 1944 : 27 : No. 28 : 41-43.

An account is given of the sweet potato varieties best adapted to conditions in Cuba, and detailed descriptions are given of the following four varieties: Yema de Huevo [Yolk of Egg], Vueltarriba, Ayala and Papa.

347. ANDERSON, W. S. *et al.* 633.492:581.6:581.02(73)  
**Regional studies of time of planting and hill spacing of sweet potatoes.**  
 Circ. U.S. Dep. Agric. 1945 : No. 725 : Pp. 20.

The results are reported of tests carried out at four locations during the period 1940-42 to determine the effect of time of planting and hill-spacing upon the yield, grade, root shape, and starch and carotene contents of sweet potatoes, the varieties Porto Rico and Triumph being used in the experiments. Delay in planting time produced significant reductions of the higher grades, regardless of location, variety, year, and spacing, and was found to be the most important factor determining yield and quality.

### FIBRES 633.5

348. HU, C. L. 633.51:575.11:575(51)  
**Progress report of the cotton department of the National Agricultural Research Bureau in China for the years 1942 to 1943, inclusive.**  
 J. Amer. Soc. Agron. 1945 : 37 : 610-15.

The results for the years 1942-3 of the work of the Cotton Department of the National Agricultural Research Bureau in the provinces of Shensi, Honan, Szechuan, Kweichow, and Yunnan, are reviewed.

The results are given of the test of American cotton at five different locations in the western part of the Lung-Hai region, including portions of the Honan and Shensi provinces. The following varieties were tested: Stoneville 3 and 4, Delfos 531 and 719, and Lone Star.

Selection has been carried out in Delfos 531, Stoneville, Coker 100-2, Chinese cotton, and hybrids between Chinese and Indian cottons, in various regions. A strain selected from a cross between Delfos 531 and okra-leaved American cotton, made several years ago, and named Chicken-foot Delfos, gave high yields in comparison with standard American cottons in the Shensi province; the strain has been renamed Central Bureau Chicken-foot Delfos and is to be increased.

Varieties among the material brought for preservation to Free China at the outbreak of the Sino-Japanese war which deserve special mention are listed. A list is also given of selections showing particular promise which have been recently developed.

The main results of the studies of the heredity of anthocyanin in Chinese cotton, carried on for several years, are summarized.

Studies are in progress on the inheritance of the following characters in American cotton: light yellowish green seedling, yellowish green seedling, white apical bud, irregular leaf vein, and wave-like marginal leaf. The linkage relationships of these characters with various other characters are also under investigation. Linkage has been observed between the three characters, irregular leaf vein, green lint and green seed.

Since 1938, in the Yunnan province, research work has been conducted on tree cottons. Strains of the native free-seeded tree cotton are under test; several varieties collected in Yunnan are under observation.

Studies have been made of the correlation of several characters. Leaf area appears to be correlated with the time of maturity and staple length; cotton with narrow leaf lobes matures earlier but has a shorter staple than broad-leaved cotton. The inheritance of certain leaf characters, such as okra leaf, yellowish green seedling, and naked seed, were found to be determined by a single factor pair, respectively, and to show independent inheritance. The homogeneous purple leaf character appears to be correlated with low yield, the heterogeneous form with short staple length. Okra-leaf cotton usually shows a higher rate of boll shedding, and a shorter fibre. In general, cotton developed from yellowish green seedlings has a shorter staple, higher lint percentage, and a smaller number of five-locked bolls.

A detailed analysis of the factors determining yield has also been made, viz., boll number, lint percentage, percentage of rotten locks, and boll-size.

Growth studies of eight varieties of Chinese cotton and ten varieties of American are reported.

349.

JURION, F.

633.51:575.42

633.51:575.12

Quelques considérations sur l'orientation de la sélection cotonnière au Congo Belge. (**Some considerations on the orientation of cotton selection in the Belgian Congo.**)

Bull. Agric. Congo Belge 1941 : 32 : 677-87.

A description is given of the improvement in yield, vegetative vigour, disease resistance, and quality obtained by mass and line selection of the variety Triumph Big Boll and other types. A brief account is also given of work on hybridization.

350.

HU, C. L.

633.51.00.14(51)

Ten years' results of experiments and extension work with Delfos cotton in China.

J. Amer. Soc. Agron. 1945 : 37 : 616-18.

An account is given of trials with Delfos 531 and of the development of the cultivation of this variety in China during the last ten years.

351.

NEELY, J. W. and

BRAIN, S. G.

633.51.00.14(76.2)

Cotton variety tests in the Yazoo-Mississippi Delta.

Bull. Miss. Agric. Exp. Sta. 1944 : No. 398 : Pp. 8; 1945 : No. 416 : Pp. 11.

The results are reported of tests of 12 varieties carried out at several different locations in 1943 or 1944, most of the varieties being the same in the two years.

352.

O'KELLY, J. F.,

FERRIS, E. B. and

ASHLEY, T. E.

633.51.00.14(76.2)

Tests of cotton varieties in the hill section of Mississippi 1942.

Bull. Miss. Agric. Exp. Sta. 1943 : No. 386 : Pp. 7.

O'KELLY, J. F.

Cotton varieties in the hill section of Mississippi 1943.

Ibid. 1944 : No. 396 : Pp. 8.

O'KELLY, J. F.

Cotton varieties in the hill section of Mississippi 1944.

Ibid. 1944 : No. 411 : Pp. 8.

The results are reported of varietal tests carried out at different localities in the years 1942-4, with several varieties and different strains of varieties such as Coker, Deltapine, Delfos and Stoneville. Among the new strains tested, Delfos 9169 has given outstanding results in two years, and Coker 100-W has given a satisfactory performance in nearly all trials of recent years, particularly on soils moderately wilt-infested.

353.

ARNY, A. C.

633.52:575(73)

Registration of improved flax varieties, III.

J. Amer. Soc. Agron. 1945 : 37 : 646-48.

The varieties, Arrow, Renew, and Koto are described. The mid-season variety Arrow was selected from a cross between Bison and Renew. It has shown immunity to the North American races of rust (*Melampsora Lini*), to *Fusarium Lini*, and pasmo (*Sphaerella Linorum*), resembling the Bison parent. It is recommended for seed-production in Montana. Renew was obtained from the cross Newland x (Reserve x Morye). This variety is immune to the common races of North American rust, only moderately resistant to wilt, and susceptible to pasmo; it is early and resistant to lodging, and is recommended for seed production in North Dakota and Montana. Koto was selected from the cross (Reserve x Morye) x Bison. The variety is susceptible to one or more of the North American races of rust. Its reaction to wilt and pasmo is similar to that of Bison. It is mid-season in maturity and resistant to lodging; it is recommended for use in Minnesota, North and South Dakota.

354. ÅKERMAN, Å. 633.52:575:581.6:578.08(48.5)  
 Det nya linlaboratoriet. En historisk överblick över dess tillkomst. (**The new flax laboratory. A historical survey of its origin.**)  
 Sverig. Utsädesfören. Tidskr. 1945 : 55 : 86-91.

GRÄNHALL, I. 633.52-2.452:576.16:631.521.6(82)  
 Det nya linlaboratoriet, dess utrustning och arbetsuppgifter. (**The new flax laboratory, its equipment and tasks.**)  
 Ibid. 1945 : 55 : 92-100.

The laboratory, recently rebuilt, is for work on hemp and flax and for the examination of the quality of new flax material from the breeder.

355. VALLEGA, J. 633.52-2.452:576.16:631.521.6(82)  
 Especialización fisiológica de *Melampsora lini*, en Argentina. (**Physiological specialization of *M. lini* in Argentina.**)  
 An. Inst. Fitotéc. Santa Catalina 1942 : 4 : 59-74.

A detailed account is given of the Argentine races of *M. Lini* (Pers.) Lév., and two new races, 42 and 42A are described. Over 200 flax varieties were tested for resistance to the more important races of the pathogen and the principal results are presented in tabular form. The varieties most promising for future breeding programmes are Saginaw x Bombay C.I.671, Bombay C.I.42, Punjab C.I.20, Indian Type 29 and Indian Type 46, immune to all Argentine races; J.W.S. C.I.708, T. Tammes C.I.332 and T. Tammes C.I.766, susceptible only to races 42 and 42A; Italia Roma 2090 and Usigus Sind Karachi 2864, resistant to races 19, 20 and 22; Ottawa 770B C.I.335, resistant to races 19 and 20; and Vologda, Leningrad, Pensa and other varieties, resistant to race 19.

356. HOUSTON, B. R. and 633.52-2.483-1.521.6:575(73)  
 STANFORD, B. H. **Tests on flax varieties and hybrids for resistance to anthracnose.**  
 Plant Dis. Reporter 1945 : 29 : 572-73.

In 1941 a considerable number of varieties and selections were tested under greenhouse conditions at the experimental station of the University of California for their reaction to *Colletotrichum Lini* Bolley, in the attempt to find resistant breeding material. The most susceptible varieties proved to be the Indian types, such as Punjab, the most widely grown variety in California. Certain selections of the varieties C.I.1008 and C.I.1009 exhibited immunity to inoculation in the seedling stage. For imparting anthracnose resistance to the two chief commercial varieties, Punjab and Argentine, C.I.1009 has been mainly used. During 1942-43 a study of the inheritance indicated that two major factors determine resistance in C.I.1009.

357. RAY, C. (jun.). 633.52-2.483-1.521.6:575(73)  
**Anthracnose resistance in flax.**  
 Phytopathology 1945 : 35 : 688-94.

A number of varieties were tested for their reaction to *Colletotrichum Lini* under greenhouse conditions at the research department of the California Central Fibre Corporation. None of the Indian varieties tested, including Punjab, showed any resistance. The Argentine types exhibited various degrees of resistance. As a group the fibre varieties appeared to have little anthracnose resistance, although a few were classified as moderately resistant. The varieties C.I.1008 and C.I.1009, Linota, Bison, Buda, and the large-seeded Argentine types, are considered to be the most promising source of anthracnose resistance for breeding.

358. HOUSTON, B. R. 633.52-2.8-1.521.6(79.4)  
 633.52-2.484-1.521.6(79.4)  
**Two important flax diseases in California in 1945.**  
 Plant Dis. Reporter 1945 : 29 : 570-71.

The varietal reaction of 19 varieties of flax to the curly top virus under field conditions in California is given. A test of the reaction of Punjab and Argentine (Calar) to *Fusarium* wilt indicated that Argentine possesses a slightly higher degree of resistance than Punjab.

359. BLACK, C. A. 633.522:577.8:631.8  
**Effect of commercial fertilizers on the sex expression of hemp.**

Bot. Gaz. 1945 : 107 : 114-20.

Slight but possibly significant alterations in the sex ratios of hemp plantings have been obtained by alterations in the soil phosphorus and potassium values.

360. STEPHENS, S. G. 633.524.35:581.45:575.11:633.51  
**Some observations on leaf shape expression in the Malvaceae.**

Amer. Nat. 1945 : 79 : 380-84.

Investigations into the genetical system determining leaf shape in *Hibiscus rosa-sinensis* L. have shown its similarity to that operative in other members of the Malvaceae, although the development of secondarily entire leaves is a point of distinction from *Gossypium*. It is suggested from these comparisons that the same basic genetical system may determine leaf shape throughout the Malvaceae. The wide variation throughout the family in the details of leaf development may be due to modifying effects, whose potentialities are, it is thought, usually underestimated.

361. PRADO, F. V. 633.562.2:581.162.5:581.145.1  
 4a. Contribución al conocimiento to de la histología y citología del maguey (Agave). (4th Contribution to the knowledge of the histology and cytology of the agave).

An. Inst. Biol. Univ. Méx. 1942 : 13 : 43-46.

An investigation into the mode of floral development in cultivated agaves has shown that the sterility of many of these forms can be attributed to the failure of the embryo-sac to develop normally.

362. OBATON, F. 633.584.3:581.162.3:576.16:578.088  
 Sur l'anthesis de deux *Salix*. (On the anthesis of two *Salix* species).

Bull. Soc. Bot. Fr. 1944 : 91 : 77-78.

Cinematograph records of anthesis in *S. cinerea* and *S. polymorpha* provide evidence of the diagnostic value of physiological characters for species which are difficult to distinguish morphologically.

### SUGAR PLANTS 633.6

363. STOKES, I. E. and 633.61(76.2)  
 ASHLEY, T. E.

**Sugarcane production in Mississippi.**

Bull. Miss. Agric. Exp. Sta. 1943 : No. 395 : Pp. 17.

The varieties extensively grown for syrup production in Mississippi are described, viz., Co. 290, C.P. 29/116, P.O.J. 213 and C.P. 31/511.

364. BRANDES, E. W., 633.61:575(76.3)  
 TAGGART, W. G. and  
 SHAFFER, J. J. (jun.)

**Release of new variety seed cane C.P. 36-105.**

Sug. Bull. N.O. 1945 : 23 : p. 169.

In co-operative tests C.P. 36-105 has compared favourably with Co. 281 and C.P. 34-120 in yield of sugar per ton of cane, but has averaged somewhat lower than C.P. 34-120 in yield of cane per acre. It showed satisfactory stubbling qualities, and is resistant to red rot and root rot, and has given low percentages of mosaic infection and chlorotic streak. On account of its relatively erect growth and satisfactory resistance to lodging the variety should prove adaptable to mechanical harvesting. In fibre content and milling qualities the variety is considered to be similar to C.P. 29-320. It is recommended for mid-season and late milling.

365. CORNELISON, A. H. 633.61:581.143:581.13:631.557(96.9)  
**Vegetative differences influence the composition of sugar cane.**

Hawaii. Plant. Rec. 1944 : 48 : 125-64.

A detailed comparison was made between the three genetically related varieties, H. 109, P.O.J. 2878 and 31-1389, for several vegetative characters and chemical characters. The largest differences between the three varieties were found in the vegetative characters and the particular development exhibited by each variety at a given age. Differences were observed in growth

rates, age types of cane in the field, the mortality rate of first-order canes, tillering and the production of secondary stands, flowering habits and response to weather conditions. Small varietal differences were found in sugar concentrations, nitrogen content and other constituents. The difference in cane and sugar yields obtained under identical conditions of culture are considered to be the result of vegetative differences in type and development rather than absolute physiological differences in photosynthesis and storage capacity. The period of physiological maturity rather than chronological age determines the behaviour of different varieties as crops; the data indicate that varieties with short physiological life cycles and therefore with poor "carry-over" qualities are not adapted to harvesting conditions in Hawaii.

366. BALCH, R. T. 633.61:581.6(76.3)  
**Report on aconitic acid studies at Houma, La., Station.**  
 Sug. Bull. N.O. 1945 : 23 : 197-98.

Varietal and environmental factors have been found to exert an important influence upon the aconitic acid content of cane juices. Co. 290 gives the highest yields of aconitic acid, the average content of samples from six locations being 1.63% for Brix solids. The suggestion is made that the cultivation of a special crop for the production of aconitic acid is worth consideration.

367. ARCEAUX, G. 633.61:581.6:578.08(73)  
**Generalized factors for computing varietal yields of sugar from results of field tests with sugarcane.**  
 Sug. Bull., N.O. 1945 : 23 : 186-91.

The data obtained in experimental tests extending over a period of 13 years indicate that accurate calculation of milling qualities from field experiments cannot be obtained unless appropriate allowance is made for varietal differences. A "varietal correction-factor" is suggested, designating the combined effect of varietal differences in milling qualities, and a simplification of the Winter-Carp-Geerlings formula for juice analyses is presented. The data have further indicated that differences in capacity for juice retention by the bagasse observed between varieties and at different levels of fibre content within a single variety detract from the value of the fibre content of the cane as a criterion of presumed extraction of juice.

368. WANG, CHI CHU 633.61-1.524(51)  
**(Introduction of sugar cane varieties and improvement of sugar cane production).**  
 Fukien Agric. J. 1944: 5: 40-57.

A report is given of a study during 1939 to 1941 on introduced varieties in Nekiang, Szechuan. The most important varieties studied were five P.O.J. types of Java, two Co. Indian types and four C.P. types from the United States. They were compared with local varieties as to growth rate, disease resistance, insect damage, ripening time and sugar content. Special attention was given to mosaic disease, red rot, and the physiological disease "empty core". Susceptibility to these diseases varied greatly with different varieties and different planting practice. Similar results were obtained with regard to susceptibility to insect attack. The local variety Luche was found to have greater growth rate and final height than the imported varieties, and it also reached maximum sugar content earlier. But the yield per acre was low in comparison with the imported varieties, on account of the low sugar content of the juice. Methods of improving sugar cane introduction and planting are discussed.

369. ARCEAUX, G. 633.61.00.14(76.3)  
**Results of sugarcane variety tests in Louisiana during 1944.**  
 Sug. Bull., N.O. 1945 : 23 : 143-49.

A report is given of the co-operative plantation tests of commercial varieties and the most promising unreleased seedlings.

370. GOUAUX, C. B. 633.61.00.14(76.3)  
**Sugar cane test fields—season of 1944.**  
 Sug. Bull., N.O. 1945 : 23 : 150-55.

The results of the field tests of commercial canes and unreleased seedlings, carried out at eight locations under the supervision of the Louisiana Experiment Station, are presented in detail.

371. CROSS, W. E. 633.61.00.14(82)  
Las cañas "tucumanas" de semillero. Resultados obtenidos hasta la cosecha de 1942 inclusive. (**The Tucumán seedling canes. Results obtained up to the 1942 harvest inclusive.**)  
Rev. Industr. Agríc. Tucuman 1943 : 33 : 151-341.  
Extensive details are given of the yielding capacity, disease resistance and sugar producing qualities of the more promising Tucumán seedlings. A table is appended indicating the genetical origin of the forms described.

372. SCHLEHUBER, A. M. 633.62:581.44:581.192:575.12(73)  
**Inheritance of stem characters in certain sorghum varieties and their hybrids.**  
J. Hered. 1945 : 36 : 219-22.  
An analysis of total solids and sucrose percentage and of stalk measurements has been made in  $F_1$  hybrids and their parents. In the cross Collier M.N. 45, a juicy sorghum, with *S. vulgare*, M.N. 352 (F.P.I. 92262), a dry pithy type, yield of juice was equal to the parental mean yield; in the lower internodes the weight per internode exceeded that of either parent, whereas in the upper internodes the weight per internode approximated to that of the dry stemmed parent. In the  $F_1$  of Straightneck M.N. 29 x Collier M.N. 45, both juicy, sweet stalked varieties, the juice quality was lower than that of either parent; in quantity of juice per stalk, however, the  $F_1$  equalled the mean parental value; the average weight of stalk in the  $F_1$  was less than that of Straightneck but exceeded that in Collier by 18%. In another cross of two juicy types, Honey Dew Drip M.N. 385 x Collier M.N. 258, hybrid vigour was shown, the  $F_1$  exceeding both parents in average weight of stalk and quality of juice.

373. 633.63:575.12:575.125(77.4)  
**Higher yields foreseen from MSC-developed sugar beet hybrids.**  
Sug. Beet J. Michigan 1945 : 10 : p. 107.  
Mention is made of the development of  $F_1$  hybrids produced by crossing varieties at the Michigan State College. Increased yields of 15-20% are expected as the result of using the hybrids, two of which are now ready for extensive field tests in Michigan.

374. 633.63:575.125  
**Story of college sugar beet seed research is WJR radio feature.**  
Sug. Beet J. Michigan 1945 : 10 : 134-35.  
The text is given of a brief broadcast account of the work begun 25 years ago at the Michigan State College to breed disease resistant varieties and  $F_1$  hybrids. Several  $F_1$  hybrids have reached the final stages of breeding, and two are ready for extensive field trials in 1946.

375. MARTENS, P. 633.63:576.356.5  
DECoux, L. and ERNOULD, L.  
Obtention, par la colchicine, de betteraves sucrières triploïdes et tétraploïdes. Note préliminaire. (**Tripleloid and tetraploid sugar beets obtained by means of colchicine. Preliminary note.**)  
Publ. Inst. Belge Amélior. Better. 1944 : 12 : 251-56.  
Colchicine treatment of the seeds of sugar beets produced polyploid and mixoploid tissue in the resultant plants.  
By suitable treatment of the inflorescences, polyploid pollen was obtained. The inflorescences of mixoploid plants were treated with colchicine and crossed with normal diploids. By this means triploid and tetraploid plants were produced. The young tetraploid plants could be readily distinguished by their larger and darker leaves. R. M. I.

376. LEVAN, A. 633.63:576.356.52:581.04:581.4:576.354.4  
**A haploid sugar beet after colchicine treatment.**  
Hereditas, Lund 1945 : 31 : 399-410.  
The morphology and cytology of a haploid sugar beet that occurred in the progeny of a colchicine treated diploid C 3841, are described. The haploid was characterized by numerous small leaves, long and narrow in shape, and a slender plant habit. The plant showed a higher pollen fertility than the triploid obtained and about the same fertility as the tetraploid; in size the pollen grains of the haploid were slightly below those of the diploids.

The haploid had a typical pachytene stage, sometimes exhibiting fairly complete chromosome pairing. During later meiotic prophase, pairing was of two kinds, spiralization and chiasma pairing. The chiasmata frequency agreed with a Poisson distribution. On the basis of this result, and also data obtained by the author from haploids of rye and other plants, the hypothesis is suggested that chiasmata in haploids are not formed between homologous segments but are scattered at random over the entire paired chromosome length.

377. DECOUX, L.,  
VANDERWAEREN, J. and  
SIMON, M. 633.63.00.14(49.3)  
Les variétés de betterave sucrière en Belgique de 1938 à 1942. II<sup>e</sup>. Communication. (**The varieties of sugar beet in Belgium from 1938 to 1942. Second Communication.**)  
Publ. Inst. Belge Amélior. Better. 1943 : 11 : 551-68.

An account is given of the varieties that have given the best results.

### STIMULANTS 633.7

378. JAKOVUK, A. S. and  
PSAREVA, E. N. 633.71(47)  
(**A handbook on the appraisal of cigarette and cigar varieties of tobacco.**)  
Vsosojuznyi Naučno-Issledovateljskiy Institut Tabačnoi i Mahoročnoi Promyšlennosti imeni A.I. Mikojana. (Mikojan Research Institute of the Tobacco and Mahorka Industry) Krasnodar 1941 : Pp. 136.  
Morphological and other characters of over 40 varieties of interest to seed-growers and the industry are described and discussed in detail. The range of variations exhibited by these characters under different conditions of growth are also considered. The varieties and their main characteristics are tabulated, and illustrations are given of each variety. I. Z.

379. KOENIG, P. and  
RAVE, L. 633.71:575  
Fortschrittsbericht über Anbau und Züchtung des Tabaks. (**Progress report on the cultivation and breeding of tobacco.**)  
Chronica Nicotiana, Bremen 1942 : 3 : No. 2 : 21-27.  
A short review is given of the continental literature on tobacco cultivation and breeding during 1940-41, reference also being made to work in Canada and Japan.

380. RAVE. 633.71:575  
Compte rendu des progrès accomplis dans la culture et l'amélioration du tabac. (**Account of the progress achieved in the cultivation and breeding of tobacco.**)  
Chronica Nicotiana, Bremen 1941 : 2 : No. 2 : 10-19.  
A review is given of the literature on tobacco cultivation and breeding during 1939-40.

381. ALCARAZ MIRA, E. 633.71:575(46)  
La Estación de Estudios del Tabaco y la investigación sobre el Tabaco en España. (**The Station of Tobacco Studies and the investigations on tobacco in Spain.**)  
Tabac, Rome 1943 : 6 : Nos 1-4 : 92-99; (also in German, pp. 100-06, and in French, pp. 107-13).  
An account is given of the achievements of the Santiponce research station, mention being made of work done in breeding new varieties, of hybridization studies, and of breeding for resistance to mosaic.

382. SMITH, T. E.,  
CLAYTON, E. E. and  
MOSS, E. G. 633.71:575(73)  
**Flue-cured tobacco resistant to bacterial (Granville) wilt.**  
Circ. U.S. Dep. Agric. 1945 : No. 727 : Pp. 7.  
A description is given of the new variety Oxford 26, developed from a cross between T.I. 488 A, a collection from Colombia, and 400. Oxford 26 has produced an average tobacco yield five

times that of Gold Dollar in plot trials on soil heavily infected with wilt; on healthy soil the yields of the two varieties were similar. The tobacco has good quality and is suitable for cigarette manufacture. The plant exhibits promising drought resistance, and has a vigorous root system; it flowers 3-7 days later than the standard varieties, and grows as tall as the large broad-leaved strains such as 400, but in leaf size resembles Gold Dollar.

383.

633.71:575(92.2)

Onderzoeken betreffende Virginia-tabak. (**Investigations on Virginia tobacco**).

Landbouw 1940 : 16 : 621-94.

The various papers below were read at a meeting to report progress in an investigation begun in 1938.

Ploeg, J. van der.

*De beteekenis van de teelt van sigarettentabak op Java.*  
(*The importance of the cultivation of cigarette tobacco in Java*). (pp. 623-29).

In 1938 official steps were taken in Java to establish a central organization for the production of "krosok", i.e. cheap and coarse tobacco, and this central body with the Landbouwkundig Instituut van het Algemeen Proefstation voor den Landbouw (Agricultural Institute of the General Experiment Station for Agriculture) established an estate for selection and breeding of cigarette tobacco at Taloen (Bodjonegoro), with, as its primary object, the production of true breeding forms of Virginia tobacco which is stated to degenerate very rapidly on importation into Java from America.

Selection of ordinary Java tobacco of types suitable for cigarettes in progress at Taloen was based on the selection of suitable lines from the heterogeneous mixture of "varieties" grown by the natives. Future work should include hybridization between imported and Java cigarette types to produce a type suited to the country and of high enough quality to take its place in the world market. The same improvement in quality is a necessity also as regards tobacco grown on estates for export.

In the discussion which followed, the Virginia variety; Harrison Special, which had been so promising, was stated to be very susceptible to *Phytophthora*. At Djember, crossing of Virginia with native tobacco was being tried to obtain a good cigarette type that could be sun dried. Hybrids of this kind with a high sugar content should be valuable.

Wanrooy, G. L.

*Onderzoek in zake de cultuur van Virginia-tabak in de residentie Bodjonegoro en de richting waarin dit werk zich verder zal dienen te ontwikkelen.* (*Investigation on the cultivation of Virginia tobacco in the Bodjonegoro residency and the direction in which this work should be further developed*). (pp. 630-45).

The general lines and methods of cultivation and curing which tobacco breeding for yield and quality must follow are outlined with reference to the tobacco breeding estate in Bodjonegoro. In 1938, 53 varieties of Virginia tobacco from U.S.A. were included in observation plot trials and 8 varieties, Yellow Mammoth, Gold Dollar (2 strains), Harrison Special, Cash, Bonanza, Virginia Bright Leaf and Jamaica Wrapper, underwent further trials in different soils in 1939 with Hickory Prior as control. Gold Dollar and Harrison Special gave prime quality tobacco but Hickory Prior did very badly.

Other observation plots were run in the same year with several more new strains from the U.S.A. Virginia Special 400, Gold Dollar strain 9, Virginia Bright Leaf (all flue-cured types), Sweet Orinoco, Flanagan (both sun-cured) and Rootrot Resistant Burley, State's Improved White Burley and Brewer Graham White Burley. The flue-cured and sun-cured groups were so promising that more exact block trials were decided upon for the next year. The quality of the Burleys which gave a light chocolate brown tobacco (krosok) could not yet be decisively determined.

With imported American varieties, continual selection for the best Virginia types is necessary in view of possible mutations or the emergence of undesirable features as a result of the new environment in Java.

To refute the view that Virginia tobacco must degenerate in Java as a result of the effects of external alterations acting upon the genotype, a degeneration trial was laid down. Several generations are to be raised and the last compared with plants from control seed.

Selection of Virginia tobacco at Bodjonegoro for resistance to *Phytophthora Nicotianae* (lanas) is most important as Virginia is much more susceptible than the indigenous tobacco. Harrison Special is so susceptible that it has had to be eliminated in spite of its high yield and quality. Selection within the Virginia varieties has been a failure and hybridization with some other highly resistant variety will have to be used. Unfortunately the varieties obtained from Timor have proved no more resistant than the Rembang varieties at Bodjonegoro.

In 1940 a large number of types were tested for resistance and as soon as an almost completely resistant variety is found it will be crossed with Virginia.

Gold Dollar 41 and Gold Dollar 155 have again done very well in the 1940 tests as in 1939. Problems of curing and the improvement of cultivation are considered. The following points were brought out in the discussion: the Castori type of tobacco is a hybrid from an indigenous tobacco (from the Besoeki region) and Virginia; Castori tobaccos have a higher sugar content than the indigenous types and are not so tall as Virginia; and micro-preparation might aid the breeder in testing and selection.

Thung, T. H.

*Waarnemingen over resistentie-eigenschappen bij verschillende tabaksoorten. (Observations on resistance characteristics in different varieties of tobacco).* (pp. 646-52).

A preliminary report is given on the work of the Institute for Plant Diseases (Institut voor Plantenziekten) on *Phytophthora* resistance in tobacco, with some incidental observations on resistance to slime disease. The methods used in infecting and testing the plants are described. Hickory Prior (No. 15) and Joyner (No. 18) were the most *Phytophthora* resistant Virginia varieties, while among the Rembang tobaccos Bkl 1 (No. 58), Br 1 (No. 78) and Br 3 (No. 80) proved the most resistant. Differences in susceptibility appear to exist between root and stems and leaves.

The Timor varieties tested seemed to have little resistance; the Djepoen varieties are considerably less susceptible.

Hickory Prior and Joyner and the Rembang tobaccos Bkl 1, Br 1 and Br 3 would appear to be of special interest for hybridization work.

A large number of crosses have been made to obtain *Phytophthora* resistant hybrids and vigorously developed forms; the seed is intended for the Agricultural Institute.

Another objective has been a new cigarette type combining desirable characteristics from non-Virginia tobaccos, e.g. crosses of Rembang types, to obtain good leaf shapes, high number of leaves and resistant qualities.

The stands obtained indicated that some varieties, e.g. Hickory Prior, were not homogeneous, the seed probably having been a mixture of different origins; and as the resulting populations may therefore comprise individual differences in regard to resistance characters, plants surviving *Phytophthora* infection are to be bagged and the seed tested for progeny with higher resistance than the average.

In general the Virginia varieties appear to be considerably less resistant to slime disease than the other varieties planted, and, judging by field impressions, this was also true as regards mosaic diseases; the Rembang varieties exhibited least mosaic symptoms and crosses should be made with some Rembang tobaccos to obtain mosaic resistant forms.

In the discussion the Timor variety was stated to be not susceptible to *Phytophthora*.

Kuilmann, L. W.

*De cultuur van Virginia-tabak na vernalisatie en bij verschillende lengten van den dag. (The cultivation of Virginia tobacco after vernalization and with different lengths of day).* (pp. 654).

Long and short day, drying and illumination immediately after germination, vernalization, continuous illumination with lamps of 100 and 6.5 watts and a neon plant irradiator were all tried as possible means of increasing the number of leaves and advancing the time of flowering in tobacco grown in the N.E.I. No increase in leaf number was obtained and no change of any importance in the time of flowering. The only positive results were obtained by illumination with an ordinary lamp, namely, an advance of at least 10 days in the transplanting date under optimum conditions.

The experiment was, however, merely tentative and the possibilities of the method are not exhausted.

Nijholt, J. A.

*Het chemisch onderzoek van sigarettentabak. (The chemical investigation of cigarette tobacco). (pp. 655-87).*

Methods and results of chemical analysis of Virginia and native Rembang tobacco of Java to determine quality are described. The effects of the position of the leaf on the stem and methods of drying upon quality are discussed.

384. KOSTOFF, D.

**Hybridization in *Nicotiana* before rediscovery of Mendel's laws.**

Tabac, Rome 1942 : 4-5 : Nos 2-4 : 26-34; (also in German pp. 35-45, and in French pp. 46-56).

A comprehensive account is given of the work done on interspecific hybridization in the genus *Nicotiana* by such early botanists as Kölreuter, Gärtner, Sageret, Godron, Naudin and Focke.

385. WHEELER, H.-M.

**A contribution to the cytology of the Australian-South Pacific species of *Nicotiana*.**

Proc. Nat. Acad. Sci. Wash. 1945 : 31 : 177-85.

Descriptions are given of the chromosome numbers and chromosome morphology of the 15 species of *Nicotiana* sect. *Suaveolentes* which are to be found in Australasia and the southern Pacific. *N. Benthamiana* and *N. excelsior* were found to have 19 diploid chromosomes instead of the 18 pairs reported by Kostoff, while the two species *N. occidentalis* and *N. fragrans*, not previously investigated, were found to have  $2n = 42$  and  $2n = 48$  chromosomes respectively. The meiotic behaviour of the following hybrids has been examined: *N. maritima* x *N. suaveolens*, *N. maritima* x *N. velutina*, *N. velutina* x *N. exigua*, *N. velutina* x *N. suaveolens*, *N. maritima* x *N. Gossei*, *N. velutina* x *N. Gossei*, *N. suaveolens* x *N. Gossei*, *N. exigua* x *N. Gossei*, *N. suaveolens* x *N. Benthamiana*, *N. suaveolens* x *N. Goodspeedii*, *N. exigua* x *N. Goodspeedii*, *N. suaveolens* x *N. megalosiphon*, *N. exigua* x *N. megalosiphon*, *N. velutina* x *N. megalosiphon*, *N. velutina* x *N. rotundifolia*, *N. maritima* x *N. Debneyi*, *N. Gossei* x *N. excelsior*, *N. Gossei* x *N. Benthamiana*, *N. Gossei* x *N. megalosiphon*, *N. Gossei* x *N. occidentalis*, *N. Benthamiana* x *N. megalosiphon*, *N. Benthamiana* x *N. Debneyi*, *N. Goodspeedii* x *N. megalosiphon*, *N. Goodspeedii* x *N. rotundifolia*, *N. Goodspeedii* x *N. Debneyi* and *N. megalosiphon* x *N. Debneyi*.

As a result of these investigations, it is suggested that the 32-chromosome species of the group are amphidiploids derived from hypothetical 16-chromosome progenitors; that the 48-chromosome species are allohexaploids derived from hybridization between species with 16 and 32 chromosomes respectively; and that the occurrence of intermediate chromosome numbers in other species is to be explained by a former hybridization between species with 32 and 48 chromosomes respectively, followed by selfing or back-crossing.

386.

633.71:576.356.5:575.127.2:575(72.95)

633.71-2.411.4-1.521.6:575(72.95)

633.71-2.8-1.521.6:575(72.95)

**Annual Report of the Tobacco Institute of Puerto Rico for the fiscal years 1941-42, 1942-43 (1945) : Pp. 65.**

An attempt to obtain fertile crosses between *Nicotiana Tabacum* and *N. rustica* by colchicine treatment is in progress, with the object of developing a hybrid strain with a greater total nicotine yield than either parent. Seeds of the two species reacted differently to colchicine treatment. Colchicine treatments for between 18 and 22 hours resulted in the highest survival of plants for the seed of *N. rustica*, while treatments of 30 to 42 hours were the most favourable for the seed of *N. Tabacum*. Polyploid plants were determined by measurement of the pollen grains, which showed an increased size, but such characters as thickened leaves and enlarged floral parts were also found to be distinctive. Some seed, although often light and "chaffy", was obtained from many of the interspecific crosses, in most of which *N. Tabacum* was used as the female parent.

Several *Nicotiana* species were tested under greenhouse conditions for reaction to common mosaic (*Marmor Tabaci* var. *vulgaris* Holmes), yellow mosaic, mottle virus and black shank. No species showed immunity to common mosaic, and on the majority of plants tested, yellow mosaic produced more severe symptoms than common mosaic. Strains of *N. rustica* have shown less severe mottle symptoms than varieties and strains of *N. Tabacum*; *N. Palmeri* proved to be

immune or highly resistant. *N. repanda*, *N. rustica*, *N. longiflora* and *N. Sanderae* were the only species exhibiting any degree of resistance to black shank.

In breeding for mosaic resistance, a considerable number of highly resistant plants approaching the commercial type have been selected from crosses between mosaic resistant selections and susceptible commercial varieties and strains.

A table is given of the reaction to mottle virus of the 134 varieties and strains so far tested. None has shown immunity or even a high degree of resistance.

A total of 16 varieties and selections, including native and improved varieties and hybrid selections, were tested for resistance to black shank in the field; eight varieties, with Florida Rg showing the highest resistance, were classed as resistant. In a comparison of eight  $F_1$  crosses with seven parental lines, only 53-A and Rg could be considered as resistant; the following  $F_1$  crosses showed a high degree of resistance: 53-A x Virginia No. 9, 53-A x Utuado x No. 1, 51-A x Virginia No. 9 and 51-A x Rg. These observations were confirmed in further selection.

387. DUSSEAU, A. and FARDY, A. 633.71:576.356.5:581.04:575.127.2  
Comportement cytogénétique de l'hybride interspécifique *Nicotiana rustica* L. var. Zlag ( $n = 24$ ) x *N. paniculata* L. ( $n = 12$ ), hautement stérile, transformé en hybride amphidiploïde fertile après traitement à la colchicine. [Cytogenetic behaviour of the highly sterile interspecific hybrid, *N. rustica* L. var. Zlag ( $n = 24$ ) x *N. paniculata* L. ( $n = 12$ ), when transformed into a fertile amphidiploid hybrid after treatment with colchicine].

C.R. Soc. Biol., Paris 1943 : 137 : 235-36.

The irregular meiotic behaviour of the diploid hybrid of *N. rustica* x *N. paniculata* is described, and contrasted with the comparatively regular meiosis of the colchicine-induced tetraploid. Up to four tetravalents were observed in the latter case.

388. ALCARAZ MIRA, E. and IZQUIERDO TAMAYO, A. 633.71:581.04:575.129  
Obtención de plantas tetraploidoides de *N. rustica* y *N. tabacum* mediante la colchicina. (The production of tetraploid plants of *N. rustica* and *N. tabacum* by means of colchicine).

Bol. Inst. Nac. Invest. Agron. Madr. 1944 : No. 11 : 49-87.

Tetraploid plants of *N. rustica* var. Hemelowka and *N. Tabacum* var. Hybrid 196-A (Valencia x Round Tip) have been produced by the colchicine technique. Detailed descriptions are given of these plants; they are characterized by low fertility, owing largely to aberrant meiosis.

389. DAWSON, R. F. 633.71:581.192:575.127.2:581.165.71:575  
An experimental analysis of alkaloid production in *Nicotiana*: the origin of nornicotine.  
Amer. J. Bot. 1945 : 32 : 416-23.

An investigation has been made of the production of nicotine, nornicotine and anabasine in reciprocal grafts of *Nicotiana glutinosa* with *N. Tabacum* and tomato, reciprocal grafts of *N. glauca* with *N. Tabacum*, and in the hybrid *N. Tabacum* ♀ x *N. glauca* ♂. It has been found that nornicotine is produced only in the plant leaf and by conversion of nicotine translocated from the root; the synthesis of nornicotine is therefore a secondary process in contrast to the synthesis of nicotine and anabasine which are produced *in situ*. The synthetic process of nornicotine is probably a transmethylation. The mechanism for the conversion of nicotine to nornicotine is found to be clearly heritable, thus explaining the observed predominance of nornicotine in hybrids between nicotine and nornicotine types. Failure to differentiate between nornicotine and anabasine in mixtures of the two is shown to account for errors in previous investigations.

390. DUSSEAU, A. 633.71:581.331.23:575.129  
Anomalies de germination du pollen chez deux hybrides amphidiploïdes de *Nicotiana*. (Anomalies of pollen germination in two amphidiploid hybrids of *Nicotiana*).

Bull. Soc. Bot. Fr. 1944 : 91 : 59-60.

Bifurcate pollen tubes and the development of two tubes from one pollen grain have been observed in the amphidiploid hybrids of *N. suavcolens* Lehm. x *N. glutinosa* L. and *N. glutinosa* x *N. silvestris* Spieg. et Comes.

391. KOSTOFF, D. 633.71:581.466:575.11:575.127.2  
 Tabakpflanzen mit gefüllten Blüten durch Artkreuzungen erhalten. (**Tobacco plants with double flowers obtained through interspecific hybridization**).  
 Züchter 1942 : 14 : No. 1.  
 [From Tabac, Rome 1942 : 4-5 : Nos 2-4 : 127-29; (also in French, pp. 130-31)].

Two types of double flower have been found in *Nicotiana Sanderae*, determined by the gene combinations *Ff* and *FF*, the double recessive being normal. Aberrant segregations occurred, however, which may be explained by meiotic irregularities. Another form of genetic control appears to determine the incidence of double flowers in *N. paniculata*.

392. ROSSI, U. 633.71:581.6:581.04  
 Die Aethylenisierung des Tabaks. Auswirkungen von Aethylengas auf einige Sorten von Rauchtabak. (**Ethylene treatment of tobacco. Effects of ethylene gas on some varieties of tobacco**).  
 Tabac, Rome 1942 : 4-5 : Nos 2-4 : 57-85; (also in French, pp. 86-99).

Varietal differences in the maturation behaviour of tobacco when treated with ethylene are reported.

393. ALCARAZ MIRA, E. 633.71:582(46)  
 Breves notas acerca de las variedades de tabaco cultivadas en España. (**Short notes on the tobacco varieties cultivated in Spain**).  
 Tabac, Rome 1943 : 6 : Nos 1-4 : 114-19; (also in German, pp. 120-23, and in French, pp. 124-26).

Descriptions are given of the morphological characters and genetical history of the varieties Valencia, Maryland, Cantabria, Habano, Havana 142, White Burley No. 5, Mammoth Gold, and four recently developed hybrids.

394. HEUSSER, C. 633.71-2.484-1.521.6(49.4)  
 Das White Burley-Problem im schweizerischen Tabakanbau. (**The White Burley problem in Swiss tobacco cultivation**).  
 Tabac, Rome 1942 : 4-5 : Nos 2-4 : 140-43; (also in French pp. 144-47).

The tobacco variety White Burley grown in Switzerland consists of a mixture of different strains. All however are susceptible to *Thielavia [Thielaviopsis] basicola* Zapf. and where this disease is serious should be replaced by the variety Findling.

395. ALCARAZ MIRA, E. 633.71-2.8-1.521.6:575.12  
 Obtención de razas de tabaco resistentes al mosaico ordinario. (**The production of races of tobacco resistant to common mosaic**).  
 Bol. Inst. Nac. Invest. Agron., Madr. 1944 : No. 11 : 89-120.

The following mosaic resistant varieties have been obtained by inter-crossing Ambalema with varieties commonly grown in Spain: Hybrid 57-A and Hybrid 57-B, from Ambalema x Valencia Alto; Hybrid 60, from Ambalema x Filipino; and Hybrid 61, from Ambalema x Kentucky. From these forms, two derivative crosses have been produced, viz. No. 230 (Hybrid 60 x Filipino) and No. 224 [Hybrid 60 x (Zaharadni Bili x Kentucky)]. Descriptions are given of the morphological characters and resistant properties of these forms.

Other crosses have been made involving the varieties already mentioned and Maryland Mammoth, Habano Mallorea, White Burley and Yalomita.

396. GERSTEL, D. U. 633.71-2.8-1.521.6:575.127.2:576.354.4(73)  
 Inheritance in *Nicotiana Tabacum*. XX. The addition of *Nicotiana glutinosa* chromosomes to tobacco.  
 J. Hered. 1945 : 36 : 197-206.

A 60-chromosome hybrid, obtained by crossing the colchicine-induced tetraploid of *N. Tabacum* var. Purpurea ( $2n = 96$ ), and a diploid subarborescent type of *N. glutinosa* ( $2n = 24$ ), was fertilized with pollen from diploid *N. Tabacum*. Two plants of the progeny exhibited the necrotic reaction to mosaic of *N. glutinosa* and had five and seven extra chromosomes respectively. After two generations of selfing, the single progeny from one of the two plants and one of the three progenies from the other plant consisted only of plants giving the necrotic and mottling

types. One of the populations giving only the necrotic resistance consisted mostly of plants with 25 chromosome pairs, the other mostly of plants with 26 chromosome pairs. These two progenies had a uniform appearance, and proved to be meiotically fairly stable. The significance of added pairs of chromosomes in evolution and plant breeding is discussed.

397. GERSTEL, D. U. 633.71-2.8-1.521.6:576.356.4:575.127.2  
**Inheritance in *Nicotiana Tabacum*. XIX. Identification of the *Tabacum* chromosome replaced by one from *N. glutinosa* in mosaic-resistant Holmes Samsoun tobacco.**  
 Genetics 1945 : 30 : 448-54.

In a previous paper (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 598) it was reported that the mosaic resistant strain of *Nicotiana Tabacum*, obtained from the amphidiploid *N. Tabacum* and *N. glutinosa* and known as Holmes Samsoun, was found to possess a pair of *N. glutinosa* chromosomes carrying the resistance factor and substituting a pair of *N. Tabacum* chromosomes. The present paper describes the work of identifying the replaced chromosome of *N. Tabacum* in monosomic plants derived from this amphidiploid.

*F*<sub>1</sub> plants of the cross between the Purpurea variety of *N. Tabacum* and Holmes Samsoun were back-crossed to Purpurea, the hybrid being used as the female parent. The monosomic plants so obtained were examined with regard to the monosome, plant morphology, characteristics of the pollen, and the mode of transmission of the monosomic condition through the egg-cell, and compared with a series of monosomic plants previously collected. From these observations and the cytogenetic analysis of a number of crosses between various monosomic forms of Purpurea and Holmes Samsoun, the replaced *N. Tabacum* chromosome was identified as the H chromosome.

398. ABELE, M. VAN DEN 633.72:582:575.42(67.5)  
**La culture du théier. (The cultivation of tea).**  
 Bull. Agric. Congo Belge 1942 : 33 : 124-73.

This general review of tea cultivation includes accounts of the history of its utilization, of its taxonomy, of selection work and selection criteria, and the technique of vegetative propagation.

399. MINY, M. P. 633.74:581.6:575.183:575.11  
**La culture du cacaoyer au Congo belge. Situation actuelle.—Perspectives d'avenir. (Cacao cultivation in the Belgian Congo. Present situation.—Future prospects).**  
 Bull. Agric. Congo Belge 1942 : 33 : 385-444.

A general review is given of cacao cultivation in the Belgian Congo, special attention being devoted to problems of breeding. The two principal breeding objectives are high yield and good quality, the latter depending largely on freedom from tannin, a condition characteristic of beans containing white cotyledons. This character is genetically determined by a single recessive gene but is also subject to xenia, being affected directly by the genetical constitution of the fertilizing pollen tube. Breeding both by mother-tree selection and hybridization is recommended, in particular the crossing of Criollo and Amenolado types. The self-incompatibility of several varieties is a factor to be taken into account.

Some useful data of Wilbaux are presented on the genetical variability exhibited by cacao trees from Gasi and Mobwasa.

400. HOLUBINSKY, I. N. 633.79:576.354.4:576.356:537.5(47)  
**Meiotic abnormalities in hops induced by atmospheric electricity.**  
 C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : 46 : 247-49.

In plants from a plantation fitted with a dense supporting wiring arrangement meiotic abnormalities were observed in the pollen mother cells undergoing meiosis at the time of a severe thunder-storm.

#### AROMATIC PLANTS 633.8

401. PENNINGTON, C. 633.821:581.162.3:578.08(72.95)  
**Vanilla pollination is no mystery.**  
 Rev. Agric. Puerto Rico 1944 : 35 : 225-33.

A detailed, popular description is given of the technique of pollinating the vanilla flower.

## OIL PLANTS 633.85

402. ADRIAENS, L. 633.85:581.6(67.5)  
 Les oléagineux du Congo Belge. (The oleiferous plants of the Belgian Congo).

Bull. Agric. Congo Belge 1943 : 34 : 397-536.

Details are given of the chemical and physical properties of the oils produced by plants belonging to the following genera: *Abutilon*, *Adansonia*, *Aleurites*, *Allanblackia*, *Allophylus*, *Aurranella*, *Baillonella*, *Blighia*, *Bombax*, *Buchnerodendron*, *Butyrospermum*, *Caloncoba*, *Capsicum*, *Carica*, *Ceiba*, *Cephalonema*, *Chrysophyllum*, *Citrullus*, *Coffea*, *Cola*, *Combretum*, *Corchorus*, *Coton*, *Croton*, *Datura*, *Diospyros*, *Dumoria*, *Eriodendron*, *Eupatorium*, *Euphorbia*, *Funtumia*, *Garcinia*, *Gilletiella*, *Glyphea*, *Gossypium*, *Guizotia*, *Helianthus*, *Heritiera*, *Hevea*, *Hibiscus*, *Holarrhena*, *Honckenya*, *Hura*, *Hydnocarpus*, *Hyptis*, *Jatropha*, *Kickxia*, *Lebrunia*, *Lindackeria*, *Lophira*, *Luffa*, *Mammea*, *Microdesmis*, *Mimusops*, *Nicotiana*, *Ochna*, *Olea*, *Oncoba*, *Omphalocarpum*, *Pachira*, *Pachystela*, *Paullinia*, *Poppea*, *Pentadesma*, *Poga*, *Quisqualis*, *Ricinus*, *Ricinodendron*, *Salvia*, *Sesamum*, *Sida*, *Sterculia*, *Strophanthus*, *Strychnos*, *Sympomia*, *Telfairea*, *Terminalia*, *Tetracarpidium*, *Thea*, *Theobroma*, *Thespesia*, *Triumfetta*, *Uapaca*, *Urena* and *Vernonia*. Vernacular names of many of the species described are appended.

403. DOMINGO, W. E. 633.853.55:581.162:575(75.2)  
**Flowerless castor-bean plants.**

J. Hered. 1945 : 36 : 116-20.

A preliminary study of flowerless castor bean plants has been made at the Plant Industry Station, Beltsville, Maryland. The  $F_1$  generations of seven crosses between normal flowering plants were all normal flowering. Flowerless plants in the proportion of 3-6% occurred in the  $F_2$  of five of the crosses. It was noted that either U.S. 4 or the spineless variant of U.S. 4 was the parent of crosses producing flowerless segregates. Indication was also obtained of the importance of environmental factors, such as day length, light intensity and temperature, in flower production.

404. LANGHAM, D. G. 633.853.74:581.45:581.46:575.11  
 633.853.74:575.11.061.6:631.547.6  
**Genetics of sesame. II. Inheritance of seed pod number, aphid resistance, "yellow leaf", and wrinkled leaves.** 633.853.74-2.7-1.521.6:575  
 J. Hered. 1945 : 36 : 245-53.

This paper reports the results of an investigation into the inheritance of four characters, viz., number of seed pods per axil, the yellow colour phase of the leaves before the plant turns brown upon approaching maturity, wrinkled leaf, and aphid resistance.

Extra pods in the leaf axil, yellow leaf colour, and wrinkled leaf, were each found to be determined by a single recessive gene, designated *t*, *y* and *f*, respectively. The results of crossing the three-podded varieties from China and India with the Venezuela three-podded Selection No. 5 indicate that the gene for the three-podded character is the same in the three varieties. It is suggested that the yellow leaf colour might be useful to the cultivator as an indication of the correct time to harvest since the phase occurs just before the capsules dehisce, and also as an aid in maintaining the purity of a variety. The character of wrinkled leaf is a semi-lethal character, and is being eliminated by selection. Marked differences among varieties, selections and hybrids in degree of resistance to aphid attack have been observed, indicating the possibility of developing aphid resistant types for commercial production.

405. LANGHAM, D. G. 633.853.74:581.45:581.49:575.11  
**Genetics of sesame.** 633.853.74:581.45:581.466:575.11-184  
 J. Hered. 1945 : 36 : 135-42.

In breeding experiments in progress at Caracas, Venezuela, the inheritance of various characters has been investigated. In the present paper the genetics of the following four characters are described: the number of foliar glands, glabrous and pubescent plants, the number of leaves, capsules and rows of seed per capsule at each node, and the absence of glands on the dorsal leaf surface.

Data from the  $F_1$  and  $F_2$  generations of crosses between the variety Criollo, with highly glandular leaves, and the Selection No. 5 with only a few foliar glands, indicate that the markedly glandular type is quantitatively inherited, incomplete dominance being observed in the  $F_1$ .

Pubescence shows simple dominance over glabrousness, the genes concerned being designated *G* and *g*, respectively. Since the classification of glabrous and non-glabrous plants can easily be made at any time during the life cycle, it is a useful means of estimating the amount of natural hybridization.

True breeding forms showing variation in the number of capsules and rows of seed per capsule at the node have not been obtained.

The Venezuela variety Jaffa and the Indian variety White are distinguished by the absence of glands on the dorsal leaf surface and tetracarpellary fruits. The data from the *F*<sub>1</sub> and *F*<sub>2</sub> of the crosses Jaffa x Criollo, Jaffa x Colombia, Jaffa x Guatemala, White x Criollo, White x Colombia, White x Guatemala and the reciprocals, show that presence of dorsal glands is dominant over absence and that bicarpellary fruits are dominant over tetracarpellary; complete correlation was found between absence of glands and tetracarpellary fruits and between presence of glands and bicarpellary fruits. The dominant gene for absence of dorsal glands and the recessive gene for their presence have been respectively designated *S* and *s*. Hybrids within the variety Jaffa have shown dominance of tetracarpellary fruits and dorsally glabrous leaves but the tetracarpellary fruits and absence of dorsal leaf glands exhibited complete association.

406. McCANN, L. P. 633.854.56:581.3

**Embryology of the tung tree.**

J. Agric. Res. 1945 : 71 : 215-29.

Cytological details are given of megasporogenesis and the development of the embryo-sac and embryo in *Aleurites Fordii* Hemsl.

407. MOROZOV, V. K. 633.854.78:575(47)

**(New varieties of sunflowers).**

Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 2 : 6-10.

Five varieties are described, and the yields of seed and oil set forth. The most frequent method of breeding was by means of repeated individual selection. Each variety is recommended for cultivation in those parts of the south-eastern U.S.S.R. where it is considered to be especially suitable. One of the varieties matures in from 74 to 83 days, or 11 to 14 days sooner than the standard, Saratovskaja No. 169.

I. Z.

408. MOROZOV, V. K. 633.854.78:575:578.08(47)

**(Methods of breeding sunflowers).**

Bjulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst. Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 2 : 11-18.

Though the oil-content of sunflower seeds has been gradually increased, their yield has been little affected. This failure is attributed to the methods of breeding sunflowers which have been evolved. Selection from bred varieties during successive years, from closely related material, all grown under similar conditions, and in a particular geographical area, has had, in some cases, a depressing effect on the yield. Spatial isolation and the method of "halves" which are also resorted to in order to consolidate the results are adversely criticized. The former is admissible as a means of increasing the oil-content only when, as regards this character, the breeding material is very variable.

The article recommends cross-pollination of individual plants, similar in the main characters, but dissimilar in their genetical content and origin.

I. Z.

409. BLARINGHEM, M. L. 633.854.78:575.183

**Xénie et fascies florales du tournesol (*Helianthus annuus* L.). [Xenia and floral fasciations of the sunflower (*H. annuus* L.)].**

Ann. Sci. Nat. (11<sup>e</sup> Sér. Botanique) 1943 : 4 : 103-18.

After a general account of the origin and natural variation of the sunflower, a description is given of a presumed case of xenia in which a group of black achenes were observed in a head otherwise white. Information is also given on the genetics of fasciated florets and diembryony in the sunflower.

410. ANANJEVA, S. V. 633.854.78:581.165.71:575.125  
**(The vegetative hybridization of sunflowers).**  
 Bjuulletenj Instituta Zernovogo Hozjaistva Jugo-Vostoka S.S.S.R. (Bull. Inst.  
 Grain Husb. S.E. U.S.S.R.) Saratov 1944 : No. 2 : 19-25.

In seeking to increase the oil content and yield of No. 169 and Saratov Early, and shorten the vegetative period of No. 3519, these three varieties were grafted on different stocks. Each variety was fertilized with mixed pollen from the ungrafted plants of the same variety. It was found that stocks which were vigorous augmented the vigour of the scions. Repeated grafting of annual sunflowers on Jerusalem artichokes modified the colour and shape of the tubers. The most pronounced influences were exercised by those stocks which were the sexual products, in the first generation, of parent plants exhibiting heterosis.

It is concluded that vegetative hybridization enables the vigour and productiveness of sunflowers to be increased, and, by means of selection and free pollination, confined within any particular vegetative hybrid, maintained thus for successive generations. I. Z.

411. CLAASSEN, C. E. and 633.854.797:575(78.2)  
 KIESSELBACH, T. A.  
**Experiments with safflower in Western Nebraska.**  
 Bull. Neb. Agric. Exp. Sta. 1945 : No. 376 : Pp. 28.

Investigations have been carried out to determine the regional adaptability of *Carthamus tinctorius* L., a new crop in the United States, its varietal characteristics and the most suitable methods of cultivation. Its adaptation in Nebraska is limited to the Panhandle region, a zone with an altitude of 3000 feet or more. The varieties tested differ markedly in oil content but not in seed yield. All the varieties of Russian origin so far studied are too low in oil content for commercial use. Pusa No. 7, Ahmednager No. 1 and Simla are considered the most valuable varieties for large-scale production. Good possibilities exist of breeding superior strains which have an oil content of 33-34%, and also remain in the rosette stage for a shorter period than varieties at present available, thus facilitating weed control.

### MEDICINAL PLANTS 633.88

412. ŽUKOVSKIĭ, P. M. 633.88(47)  
 633.9(47)  
**(New kinds of plant material of special interest).**  
 Moskovskaja ordena Lenina Seljskohozjaistvenija Akademija imeni K.A. Timirjazeva. Naučnaja Konferencija 3-10 iyunja 1944 g. Doklady. [Proc. Sci. Conf. Timirjazev Agric. Acad. (3-10 June, 1944)] 1945 : No. 1 : 7-13.

The author gives a brief account of substances of plant origin which are employed in medicine and industry. Among the plants mentioned are thyme, hyssop, anise, *Dracocephalum* spp., *Artemisia* spp., mustards, horse-radish, onions, garlic, *Citrus* spp., laurel, eucalyptus, *Laurocerasus* spp., and *Prunus virginiana*.

In view of the function of carotinoid pigments in plant reproduction, it is believed that they may prove useful in facilitating plant hybridization. I. Z.

413. FLÜCK, H. 633.88:575(49.4)  
 576.356.5:581.04(49.4)  
 Probleme der Arzneipflanzenproduktion in der Schweiz. **(Problems of the production of medicinal plants in Switzerland).**  
 Vjschr. Naturf. Ges. Zürich 1941 : 86 : Nos 3-4 : XXIII-XXIV.

Increased production of medicinal plants became a necessity in Switzerland during the war. The following recommendations were made in December 1941 as a way of obtaining plants with a high content of medicinal constituents: (1) the breeding of high quality races--this has already been achieved with Peruvian bark; (2) the production of polyploid races by colchicine, and similar methods; and (3) planting in suitable climatic environment and soil, and the adoption of proper methods of cultivation.

The collection of wild plants should also yield a good harvest of good quality.

414. STEERE, W. C. 633.885.1:581.6:581.9(86)  
**The discovery and distribution of *Cinchona pitayensis* in Ecuador.**

Bull. Torrey Bot. Cl. 1945 : 72 : 464-71.

A detailed account is given of the geographical distribution of *C. pitayensis* in Colombia and Ecuador, also some indication of the relation between alkaloid content and locality.

### RUBBER PLANTS 633.91

415. KROTKOV, G. 633.913  
**A review of literature on *Taraxacum kok-saghyz* Rod.**

Bot. Rev. 1945 : 11 : 417-61.

A review is given of the literature relating to the morphology, anatomy, biochemistry, cultivation, pathology and technology of *T. Kok-saghyz*. Most of the papers relating to breeding have already appeared in *Plant Breeding Abstracts* and have been reviewed collectively in the bulletin on the *Cultivation and Breeding of Russian Rubber-bearing Plants* published by the Imperial Bureau of Plant Breeding and Genetics.

416. A-N, G. 633.913:575(48.5)  
 575:633(48.5)  
**Utsädesföreningens extra möte under Lantbruksveckan 1945. (Special meeting of the Seed Association during the Agricultural Week 1945).**

Sverig. Utsädesfören. Tidskr. 1945 : 55 : 144-46.

In the report given at this meeting on the work on the Swedish Seed Association the extensive trials and breeding operations with *Taraxacum* for rubber are mentioned.

The chemical, cereal, baking and flax laboratories were all active.

Prof. G. Nilsson-Leissner, who is now director of the State Central Seed Control Institute (Statens Centrala Frökontrollanstalt), read a paper on the improvement of pasture plants which is to be published and Dr Levan read a lecture on polyploidy in plant breeding (cf. Abst. 154).

417. ROLLINS, R. C. 633.913:575.127.2:581.16:575(73)  
**Interspecific hybridization in *Parthenium* I. Crosses between guayule (*P. argentatum*) and mariola (*P. incanum*).**

Amer. J. Bot. 1945 : 32 : 395-404.

The progenies of 36 crosses between guayule and mariola have been studied. Plants of guayule with a chromosome number of  $2n = 36$  were entirely sexual in behaviour, and when guayule was the female parent the resulting progenies were all hybrids. Guayule plants with a chromosome number  $2n = 72 \pm$  reproduced largely by apomixis; the number of hybrids derived ranged between 4.2 and 38.5%.

Single  $F_1$  progenies of many hybrids gave three types of plants, viz., a maternal plant type produced apomictically, hybrids produced by normal sexual reproduction, and aberrant hybrids which arose by the non-reduction of the egg-cell and subsequent fertilization.

The number of possible combinations is greatly increased by the long polyploid series existing in both species, the fact that both reduction and non-reduction occur at each chromosome level in both species except in the forms with an entirely sexual mode of reproduction, and by the general compatibility of the interspecific crosses.

Four wild types of guayule with certain mariola-like characteristics have been approximately duplicated by controlled interspecific hybridization. It is evident that a high proportion of natural crossing between mariola and guayule occurs.

In view of the ease with which hybrids between the two species can be obtained and of the fact that mariola possesses characteristics which will probably prove valuable in improving guayule as a source of rubber, it is considered that interspecific hybridization involving these two species has an important place in the commercial breeding of guayule.

418. ANDERSSON, G. and BENGTSSON, G. 633.913:575.42:578.08(48.5)

Redögörelse för första årets arbeten med gummimaskros vid Sveriges Utsädesförening. (Report on the first year's work with koksaghyz by the Swedish Seed Association).

Sverig. Utsädesfören. Tidskr. 1945 : 55 : 174-200.

The geographical origin of kok-saghyz, the history of its cultivation and its botanical characteristics are described, with a brief mention of recent cultivation trials in Germany, the Baltic States, Poland and the U.S.A.

An outline of the Swedish programme and the technique employed in research on cultivation, selection and breeding, is given in some detail.

In autumn 1944, individual selection from a population of 45,000 plants was carried out on the basis of latex content determinations; the plants chosen were then replanted in the greenhouse or field. The variation in rubber content ranged between 0.2 and 8.0% of the fresh weight. The quality of the seed from an extra seed generation obtained from about 1200 selected plants grown in the greenhouse under artificial light was astonishingly high; it is being used for comparative trials and for further breeding.

Over-wintering trials and breeding by hybridization, induced X-ray mutation and polyploidy following colchicine treatment have also been carried out, though it is too soon yet to state the results. Larger seed and more vigorous and rapidly growing seedlings with stiffer flower stalks should be among the aims in breeding.

419. POWERS, L.

633.913:581.16:576.356.5:576.16(73)

**Fertilization without reduction in guayule (*Parthenium argentatum* Gray) and a hypothesis as to the evolution of apomixis and polyploidy.**

Genetics 1945 : 30 : 323-46.

An investigation of three generations of the progeny of an individual plant growing in Texas (seed collection No. 42163) indicated that this individual plant and most of its progeny were abnormal facultative amphimicts with a chromosome number of  $90 \pm$  to  $108 \pm$ , i.e. plants in which the predominant reproductive process is non-reductive meiosis followed by fertilization. In addition to this mode of reproduction, pseudogamous diplospory and normal sexuality were also found; diplospory represents a method of reproduction in which different degrees of chromosome pairing are observed and which is intermediate between normal sexuality and non-segregating apomixis. Non-segregating apomixis was probably also present. All these reproductive modes admit of degrees, grading into each other, and probably all occur in one plant. Fertilization was partially dominant, and the number of factor pairs determining occurrence or absence of fertilization appeared to be comparatively small.

An hypothesis relating to the evolution of apomixis and polyploidy in non-gametic populations is advanced. It is suggested that at least three main stages are involved in the evolution of apomixis from normal sexuality, viz.: (1) non-reduction of chromosome number, (2) absence of fertilization, and (3) the development of non-reduced female cells without fertilization. Hybridization must have had an important effect in the evolution of apomixis and polyploidy, and probably both intraspecific and interspecific hybridization were involved. The data obtained suggest that in *Parthenium* both apomixis and polyploidy evolved simultaneously.

420. FEDERER, W. T.

633.913-1.421(73)

**Studies on sample size and number of replicates for guayule investigations.**

J. Amer. Soc. Agron. 1945 : 37 : 469-78.

A study has been made of the effect of sample size and number of replicates upon experimental precision. From the data obtained from investigations of seven widely differing one-year old varieties with respect to percentage of rubber, dry weight and weight of rubber per shrub, the following results were obtained: (1) significant differences were found in the varietal means for weight and percentage of rubber per plant; (2) the variability within a variety for the dry weight per plant was much higher than for the percentage of rubber which showed relative uniformity; (3) the variability in the weight of rubber per plant was approximately equal to that found for the dry weight of shrub; (4) little increase in accuracy could be gained in the present experiment by harvesting more than 12 plants per sample; (5) the number of replicates to be used in any experiment depends upon the desired accuracy and the characters to be estimated.

## FRUITS AND NUTS 634

421.

HsÜ, SHAO HUA

634(51)

(A list of varieties of vegetables and fruits of the Shao Wu horticultural station of Fukien University).

635(51)

Fukien Agric. J. 1941 : 3 : 370-79.

This list includes vegetables, cucurbits, root crops, spices, bananas, apples, peaches, pears, plums, cherries, grapes and citrus fruits.

T. C. Y.

422. ELAZARI-VOLCANI, I. 634:575(56.9)

**Activities of the Agricultural Research Station, Rehovoth.**

Proc. Conf. Middle East Agric. Develop. Cairo February 7th-10th 1944 : Agric. Rep. No. 6 : 124-31.

The subjects of current research at the Rehovoth Station are listed. Among them are: (1) seed selection in maize and barley; (2) the adaptation of rootstocks and varieties of deciduous fruits to soil and climatic conditions; (3) varietal tests of mango and avocado; (4) methods of budding mango; (5) the selection of early and late varieties of dessert grapes; (6) the production of summer lemons; and (7) the problem of the lack of bearing of the citrus variety Clementine.

423. DUSTMAN, R. B. 634.11:581.46:581.47:581.192(75.4)

**Sugar distribution in the blossoms and fruit of three varieties of apple.**

Proc. W. Va Acad. Sci. 1945 : 17 : 42-46.

An analysis of sugars and other constituents has been made in the blossoms and fruit of three varieties, Melba, Rome Beauty and Stayman Winesap.

424. TUKEY, H. B. and 634.25:581.481:581.143.26.03

**CARLSON, R. F. Morphological changes in peach seedlings following after-ripening treatments of the seeds.**

Bot. Gaz. 1945 : 106 : 431-40.

Varietal differences have been discovered in the percentage of aberrant seedlings produced by planting excised peach seedlings. The anomalies observed were seldom perpetuated beyond the seedling stage, and it is possible that they may be related to vernalization effects.

425. WHITEHOUSE, W. E. 634.25-2.6-1.521.6:575(75)

**Peach rootstocks resistant to root knot nematode.**

Agric. Tec. Chile 1944 : 4 : 145-50.

A review is given of papers dealing with the problem of producing nematode resistant stocks in the south of the United States.

426. CHEN, WEN HSIEN 634.3:575(51)

**(The Citrus Experiment Station of Fukien University).**

Fukien Agric. J. 1940 : 2 : 231-38.

A report is given of work in progress on 23 varieties of citrus fruits. Special attention is paid to important native varieties, such as *Citrus poonensis* Hort. and *Citrus sinensis* Osbeck. Fruit characters, yield, ripening time, keeping qualities, etc. are discussed. T. C. Y.

427. LARSEN, G.-H. 634.322:575.42(65)

**Improductivité du Clémentinier. (Unproductiveness of the Clementine).**

Bull. Doc. Renseign. Agric., Serv. Arb. Algér. 1942 : No. 92 : 15-18.

The selection of those trees of the Clementine tangerine that produce an annual crop is urged.

428. SIMONNEAU, P. 634.322:581.162.32

Action de la pollinisation du Clémentinier par les autres espèces d'agrumes.

**(Effect of pollination of the Clementine by the other citrus species).**

Bull. Doc. Renseign. Agric., Serv. Arb. Algér. 1945 : No. 118 : 10-11.

Pollination of the Clementine tangerine by the Mandarin orange gives rise to improved fruit sets, but the number of seeds is also increased.

429. REBOUR, H. 634.322:581.162.5

**Anomalies de la floraison du Clémentinier. (Anomalies of the blooming of the Clementine).**

Bull. Doc. Renseign. Agric., Serv. Arb. Algér. 1945 : No. 118 : 4-6.

A discussion is presented on the causes of sterility in the Clementine tangerine. Examples have been collected of aberrant floral development which is believed to be a contributory cause of this condition.

430. MAURI, N. 634.37:582(65)  
 Les figuiers cultivés en Algérie. (**The figs cultivated in Algeria**).  
 Bull. Doc. Renseign. Agric., Serv. Arb. Algér. 1944 : No. 93 : Pp. 103.  
 A series of plates is given of the following Algerian varieties: Abakor, Abiarous, Aboucherchaou, Abougandjour, Adjaffar, Agouarzguilef, Agoussim, Alekake, Amesas, Aranim-Aberkane, Aranim-Amellal, Averane, Avouzegar', Azaïch, Azendjar, Bouankirk, Dottato, Smyrne, Tabelout, Tadefouit, Taharit, Taklit, Takourchit, Tameriout, Taranimt, Taroumant and Tazarift.

431. FRIES, R. E. 634.41:576.16:582  
 Einige Gesichtspunkte zur systematischen Gruppierung der amerikanischen Annonaceen-Gattungen. (**Some views on the systematic grouping of the American genera of the Annonaceae**).  
 Ark. Bot. 1943 : 30A : No. 8 : 1-31.  
 This tentative systematic classification of the generic groups provides some indications of the inter-relationships of the genera within the individual groups and may throw some light on relevant phylogenetic problems.

432. CRANDALL, B. S. 634.451-2.484-1.521.6(73)  
 A new species of *Cephalosporium* causing persimmon wilt.  
 Mycologia 1945 : 37 : 495-98.  
 A description is given of *Cephalosporium Diospyri*, a new species causing a wilt disease in the American persimmon, *Diospyros virginiana* L. The Oriental persimmon, *D. Kaki* L., is nearly immune, but often dies when grafted on the roots of the susceptible *D. virginiana*. By inoculation it has been found that *D. Ebenaster* L. is highly susceptible, *D. texana* L. fairly susceptible, and *D. Lotus* L., used as grafting stock in the East, very slightly susceptible. Inoculations on *D. Rosei* Standley and *D. discolor* Willd. failed to produce infection.

433. MIDDLETON, G. K., 634.58-1.8:581.6:575(73)  
 COLWELL, W. E.,  
 BRADY, N. C. and  
 SCHULTZ, E. F. (jun).  
 The behavior of four varieties of peanuts as affected by calcium and potassium variables.  
 J. Amer. Soc. Agron. 1945 : 37 : 443-57.  
 The effect of calcium and potassium in fertilizer practice upon yield, true shelling percentage and the percentage of ovarian cavities filled, has been studied in four varieties differing widely in type and size of seed, viz. Virginia Bunch, North Carolina Runner, Spanish 2B and White Spanish. Calcium was found to exert an important effect upon yield and quality, the varieties exhibiting pronounced difference in response. Increases in yield and quality due to added potash were small and showed little varietal difference in comparison with those produced by the use of gypsum. The factors of fertilizer treatment and variety had comparatively little effect upon the oil content in large or medium sized kernels.

434. CHEN, WEN HSIUN 634.65(51)  
 (Cultivation of litchi in Putien and suggestions for improvement).  
 Fukien Agric. J. 1941 : 3 : 255-67.  
 A description is included of the morphological and anatomical characters, quality and ripening time of the most famous local varieties. T. C. Y.

435. CRÉTÉ, P. 634.65:581.481  
 Polyembryonie chez l'*Actinidia chinensis* Planch. (**Polyembryony in A. chinensis** Planch.).  
 Bull. Soc. Bot. Fr. 1944 : 91 : 89-92.  
 An instance of polyembryony in *A. chinensis* is figured and described.

436. MURRILL, W. A. 634.715:581.47:575.242.061.6:575(73)  
 A white blackberry.  
 J. Hered. 1945 : 36 : 217-18.  
 Recessive white-fruited mutants of the common sand blackberry, *Rubus cuneifolius* Pursh, have been found at three localities in Florida; these, with selection, may be economically valuable. Experiments have shown that the fruits do not develop without pollination, and that the form is completely self-incompatible.

437. GUSTAFSSON, Å. and SCHRÖDERHEIM, J. 634.74:577.16:575.127.2  
**Ascorbic acid in Rosa hybrids.**  
 Hereditas, Lund 1945 : 31 : 489-97.  
 Ascorbic acid content has been determined in  $F_1$  hybrids involving the following: two types of *Rosa rugosa*, *R. rubiginosa*, *R. canina* var. *Blondaeana*, and two widely different types of *R. canina*. Hybrids between *R. rugosa* and *R. canina* types I and II, and the hybrid *R. canina* II x *R. rubiginosa*, exhibited a marked increase in ascorbic acid content in comparison with the parents. Considerable reciprocal differences in ascorbic acid, morphological and other characters, were observed in crosses between *R. canina* II and *R. rubiginosa*, the cross *R. canina* II ♀ x *R. rubiginosa* ♂ being highly sterile in contrast to the highly fertile reciprocal hybrid with a low ascorbic acid content. A discussion is given of the question whether  $F_1$  increase in vitamin C is due to a favourable genetic combination and is associated with sterility.

438. DERMEN, H. 634.76:575.255:576.356.5:581.04:581.8  
**The mechanism of colchicine-induced cyto-histological changes in cranberry.**  
 Amer. J. Bot. 1945 : 32 : 387-94.  
 The cytology and histology of polyploid sectorial and periclinal chimaeras induced by colchicine treatment in the cranberry have been investigated with the object of obtaining data which will be valuable in overcoming difficulties in inducing polyploidy in semi-woody and woody plant types. The development of the two types of chimaera is described in detail.

439. OBERLE, G. D. 634.835:575(74.7)  
**New grapes bred to order.**  
 Rural New-Yorker 1944 : 103 : p. 436, 476.  
 The achievements and aims of the grape-breeding programme begun in 1890 at the New York Agricultural Experiment Station, Geneva, are outlined. Extensive hybridization between European varieties and native wild grapes has been carried out in the attempt to combine the desirable characteristics of the European grape with the winter hardiness, resistance to disease and insect pests and soil adaptations of the native grapes. Among the new varieties produced in the earlier breeding programme, Ontario, Portland, Fredonia and Sheridan, in particular, have become commercially important. Descriptions are given of the several new varieties which have been developed and named since 1937. Van Buren, Athens, Kendaia and Westfield are new varieties of the Concord type, i.e. they are typified by a "slip" skin, tough pulp, acid flavour about the seeds, and the "foxy" flavour and aroma characteristic of American varieties. The black varieties Buffalo and Eden, and red varieties Hector, Yates and Ruby are Californian or European types which have been released for trial. Approximately 10,000 seedlings are under observation. Among those to be further tested are seedless and muscat types, types which show promise for use as a source of juices, and extremely early maturing vines.

440. FENNELL, J. L. 634.835:581.331.2:581.165.71:575.12(73)  
**Timing and production of grape pollen by grafting.**  
 J. Hered. 1945 : 36 : 183-85.  
 A method of controlling pollen production by carefully timed grafts is described, which is valuable in overcoming the difficulties in hybridization work due to divergence in normal flowering periods and flowering inability owing to climatic conditions.

441. BÖRNER, C. 634.835-2.7-1.521.6:575.11  
 Parasitäre Spezialisierung und pflanzliche Immunität nach Untersuchungen über die Reblaus. (Parasitic specialization and plant immunity from investigations on *Phylloxera*).  
 Verh. VII Int. Kongr. Ent. 1939 : 4 : 2279-90.  
 The problem of the occurrence and causes of heritable variation in host and parasite is discussed and exemplified by reference to the changes caused in the interaction between them and the consequent alterations in the range of the particular parasite, e.g. the range of *Phylloxera* species on different species of *Vitis*. Possible theoretical implications of the immunity reaction in vines to *Phylloxera* are also considered with reference to its effects upon the host range. From an analysis of selected data on

the reaction of vine species and varieties to biotypes of *Phylloxera* the author concludes that numerous independent Mendelian factors for resistance (or immunity) exist. Such Mendelian factors may have been introduced into the vine genotypes by (1) mutations acting against the originally positive reaction system of the vine to *Phylloxera*, and (2) the presence of "weakness factors", defined as factors causing only "a reduction or elimination, in the particular cases concerned, of the virulence of the *Phylloxera*".

The second theory is borne out by the mode of inheritance of the typical reaction of the heterozygous *Phylloxera* biotype 521 and its sexual progeny as leaf parasites on *Riparia Tiefenbach*. This vine transmits its negative reaction to biotype 521 as a monohybrid dominant. But whereas 30 out of the 40 of the progeny of the biotype 521 showed the parental type of reaction, the remaining 10 produced normal leaf galls on this *Tiefenbach* vine. This suggests that a monohybrid segregation of a heterozygous *Phylloxera* is operating and that *Phylloxera* biotypes of homozygous dominant and heterozygous constitutions react negatively to the immunity factor of the vine in question, whereas homozygous recessive individuals are able to induce gall formation.

Similar data for other vines and vine hybrids on segregation into types of high and low sensitivity are cited, including an instance of recessive inheritance of weakness factors in the reactions exhibited by a triple hybrid Na. 170-2 to biotype 521. Though further evidence is required here, it is interesting to note that (1) the segregates of different *Phylloxera* strains behave differently when inoculated on the one hand into *Riparia Tiefenbach*, and on the other into *Rupestris Ganzin* or *Berlandieri Viala*, with regard to sensitivity or non-sensitivity; and (2) biotype 521 is apparently homozygous in its reaction to the immunity factors which *Riparia Geisenheim* 181, M.9.101-14, C 3309 and *Vin. x Rup. Na. 59* exhibit in regard to other *Phylloxera* biotypes. It would therefore appear that the various immunity and resistance factors of vines are invariably associated only with quite definite weakness factors in *Phylloxera*.

Vine breeders will in future aim not only at producing the strongest defence combination in their vines and testing the latter for yield, but also at discovering whether *Phylloxera* biotypes can be bred that are uniformly virulent to all these defence factors, i.e. that are free from weakness factors. Fortunately this possibility appears unlikely.

It seems certain that the vine and *Phylloxera* vary or mutate entirely independently of each other.

## FORESTRY 634.9

442.

634.975:575(48.5)

634.975:576.16(48.5)

Redogörelser för verksamheten vid Statens Skogsförskönsanstalt under åren 1941-1944. (Report on the work of the State Institute of Experimental Forestry during the years 1941-44).

Medd. Skogsförskönsanst. Stockh. 1945 : 34 : 417-50.

1941

Following on the advance in statistical methods, the new sylvicultural production studies are to be based not, as hitherto, on established sample areas under observation for many decades, but on single observations of any sample plots where representative sample trees can be felled. The increment will be measured by a boring instead of diameter measurements extending over five years.

Olaf Langlet continued his genetic studies, including the inheritance of physiological differences between pine of different provenances, work on winter coloration in the pine, and the reaction of the crown in this species to various types of external interference.

1942

Observations on production were continued (cf. Näslund's published report on spruce). Petrini completed his investigations on the Institute's oak plantations and issued his report on the Swedish series of trials in the 1907 international investigations on pine provenance. The geo-botanical survey of Västerbotten has been completed.

In connexion with Olaf Langlet's research on problems of races of forest trees, pine and spruce of various provenance have been planted in two localities.

1943

The routine production investigations in 1942 were extended and a study was made of (1) timber qualities that are characteristic of racial types, and (2) how far quality depends on race. The

Association for Forest Tree Breeding has co-operated in selecting and describing typical specimens from which samples of wood are taken.

In collaboration with the State Board for Demesnes and for Forests, the germination capacity of Norrland conifer seed, as well as cone production and seed germination in residual spruce was studied by Tirén.

O. Långlet carried on his studies of races and relevant physiological problems.

#### 1944

Reorganization of the Forestry Research Institute was undertaken involving some changes in the scope of its research divisions and the appointment of staff. A statistical division was created. Work proceeded on the germination capacity of conifer seed; a method of sampling seed was also evolved, and the results of analyses of germination were published by Tirén as a guide for cone collection in 1944-45.

The findings from a spruce provenance experiment should be ready for publication in 1945. O. Langlet continued his work on forest tree races and in some districts inspected pine and spruce of different provenance (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1384).

443. JOHNSSON, H. 634.972.3:576.356.5:575.12:581.4:581.1  
**The triploid progeny of the cross diploid x tetraploid *Populus tremula*.**  
 Hereditas, Lund 1945 : 31 : 411-40.

Crosses were made between various diploid aspens as the female parents and a tetraploid aspen as the male tree, and also between the same female parents and diploid trees. A reduction in fertility of 21% was observed as the result of using tetraploid pollen. Chromosome counts of the yearling progeny of the cross diploid x tetraploid gave a percentage of 46.3%, plants with the triploid number,  $2n = 57$ ; 86.9% of the progeny fell within the range of 54-59 chromosomes. A detailed study was made of the size and number of the stomatal and wood cells, growth of the stem, wood quality, and the physiology of the yearling aspens. A primary effect of triploidy was found to be increased cell size, as observed in the pollen grains, stomatal and wood cells. Secondary effects of the triploidy were evident in leaf gigantism, increased water content, and reduced specific gravity of the wood. The triploid condition did not lead to any gigantism in the stems of the young plants; it is however considered probable that such gigantism may occur in older aspens. No specific effect of triploidy upon the physiological and chemical properties analysed was found. The results obtained are discussed with reference to the value of the data in the estimation of future development of the trees, and the relevant work of other investigators.

444. JOHNSSON, H. 634.972.3:576.356.5:576.312.35  
**Chromosome numbers of the progeny from the cross triploid x tetraploid *Populus tremula*.**  
 Hereditas, Lund 1945 : 31 : 500-01. (Abst.).

In previous papers the chromosome numbers of the progeny from crosses between diploid and triploid aspens (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 212), between triploid and triploid (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 338), and between diploid and tetraploid (cf. Abst. 443), have been determined. In the present paper the results are reported of the chromosome counts of 200 plants from the cross triploid x tetraploid. Chromosome numbers from 50 to 102 were found. The individuals with chromosome counts ranging between 83 and 102, originating from unreduced triploid gametes, represent 5% of the total number, compared with the 2.9% previously found in the progeny of the cross diploid x triploid.

445. SWINGLE, R. U., 634.972.8-2.1-1.521.6:575.127.2(73)  
 MEYER, B. S. and  
 MAY, C.  
**Phloem necrosis research during 1944.**  
*Phytopathology* 1945 : 35 : p. 489. (Abst.).

Seedlings and clones of *Ulmus americana* have been tested for resistance to phloem necrosis. Preliminary results indicate that much of the material is resistant. Some natural hybrids between *U. fulva* and *U. pumila* also appear to be resistant.

446. BUCHHOLZ, J. T. 634.975:581.141:575.127.2:575.125  
**Embryological aspects of hybrid vigor in pines.**  
 Science 1945 : 102 : 135-42.

In an investigation of the development of the embryo in the heterotic hybrid, *Pinus Murryana* x *P. Banksiana*, and the parents, the hybrid embryos developed more rapidly than those of the parents, but no evidence was obtained that hybrid vigour is associated with a larger embryo size at comparable stages of development or with larger meristems in the embryo. The nature of hybrid vigour was therefore shown to consist of physiological vigour in growth.

447. NEWCOMER, E. H. 634.975:581.163:575.127.5  
**Induced parthenocarpy in *Ginkgo*.**  
 Amer. Nat. 1945 : 79 : 186-87.

An apparent case of parthenocarpy is reported for a *Ginkgo* tree which had been pollinated by *Cedrus Deodara* (Roxb.) Loud. Four seeds were obtained with an indication that embryos had been formed.

448. MIROV, N. T. 634.975:581.165.71:581.192  
**Effect of the crown on the composition of oleoresin in pines.**  
 J. For. 1945 : 43 : 345-48.

It has been found that aldehydes, which are normally absent from the xylem of *Pinus ponderosa* Laws., are produced there when *P. Sabiniana* Dougl. is grafted upon it. Conversely, aldehyde formation in *P. Sabiniana* is reduced in the reciprocal graft.

449. COOK, D. B. 634.975:581.44  
**An abnormal balsam fir.**  
 Torreya 1945 : 45 : p. 13.

An aberrant individual of *Abies balsamea* (L.) Mill. is described; it is devoid of lateral buds and is consequently unbranched.

450. FASSETT, N. C. 634.975:581.9:575.127.2  
***Juniperus virginiana*, *J. horizontalis* and *J. scopulorum*—IV. Hybrid swarms of *J. virginiana* and *J. horizontalis*.**  
 Bull. Torrey Bot. Cl. 1945 : 72 : 379-84.

The ranges of *J. horizontalis* and *J. scopulorum* overlap in several localities. In some instances, the zones of overlap are marked by the presence of intergrading forms, while elsewhere, the two species co-exist without intermixture (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 365).

451. FASSETT, N. C. 634.975:581.9:582(73)  
***Juniperus virginiana*, *J. horizontalis*, and *J. scopulorum*—V. Taxonomic treatment.**  
 Bull. Torrey Bot. Cl. 1945 : 72 : 480-82.

This article summarizes the taxonomic and phytogeographical results of the author's work on *J. virginiana* and *J. scopulorum* (cf. Abst. 450).

452. MARTINEZ, M. 634.975:582(72)  
 Una nueva pinácea mexicana: *Picea chihuahuana* sp. nov. (A new Mexican member of the Pinaceae: *P. chihuahuana* sp. nov.).  
 An. Inst. Biol. Univ. Méx. 1942 : 13 : 31-34.

A newly discriminated Mexican pine species *P. chihuahuana* is figured and described.

453. MARTINEZ, M. 634.975:582(72)  
 Tres especies nuevas mexicanas del género *Abies*. (Three new Mexican species of the genus *Abies*).  
 An. Inst. Biol. Univ. Méx. 1942 : 13 : 621-34.

The following new species of *Abies* are figured and described: *A. durangensis*, *A. mexicana* and *A. Vejari*.

454. MARTINEZ, M. 634.975:582(72)  
 Una nueva especie del género *Pinus* : *Pinus michoacana*. (A new species of the genus *Pinus*: *Pinus michoacana*).  
 An. Inst. Biol. Univ. Méx. 1944 : 15 : 1-6.

The species *P. Montezumae* Shaw is regarded as comprising too heterogeneous a collection of forms. The author has consequently segregated some of these into a new species *P. michoacana* which is described and figured.

455. MASON, H. L. and STOCKWELL, W. P. 634.975:582:575.127.2(79.3)  
**A new pine from Mount Rose, Nevada.**  
 Madroño 1945 : 8 : 61-63.

A description is given of a new pine species, *Pinus washoensis*, resembling *P. Jeffreyi* in external characters, which has been discovered in Nevada.  $F_1$  hybrids between this and other pines have been successfully reared.

456. HEIMBURGER, C. C. 634.975-2.111-1.521.6:575(48.5)  
**Report on strain tests of Scots pine and Norway spruce, Petawawa projects 52 and 53. Scots pine (*Pinus silvestris*).**  
 Rep. Inter. Un. For. Res. Organizations, Stockholm 1945 : 17-20.

Tests carried out at the Petawawa Forestry Experimental Station indicate that the best breeding material consists of strains of pine from East Prussia, Latvia and Poland, in addition to certain Ontario strains, and strains of spruce from Northern Germany, the Black Forest, and Valea Mare, Rumania, in addition to the progeny of trees selected at the Station. In the tests of spruce particular attention was given to winter hardiness.

### VEGETABLES 635

457. FROLOV, I. 635:575(47)  
**(Experiments at the State farm "Lesnoi").**  
 Sovhoznoe Proizvodstvo (State Farming) 1944 : No. 8-9 : 29-30.

This article describes the results of variety trials in which potatoes, tomatoes, carrots, table beet, onions and other vegetable crops were investigated. Seed production was the subject of enquiry as regards carrots and beet. Plants grown from carrot crowns were made to produce seed, the yield of which was equal to that of seed grown in the normal way. Varieties are being improved by means of selection. The soaking of beet seed before sowing doubled the yield of roots. The quality of tobacco seed of the varieties Tyn-Kulas and Dubec was improved by breaking off up to 50% of those seeds formed towards the latter part of the season. I. Z.

458. **The way to better seeds.** 635:575(48.9)  
 J. E. Ohlsens Enke, Copenhagen. Pp. 43.

A detailed and well illustrated account is given of the methods of breeding vegetables at the stations of the old-established seed-growing firm of Ohlsens Enke at Clausen, near Copenhagen, and Slätthög, near Malmö in Sweden.

459. HARPER, R. H. and ZSCHEILE, F. P. 635.13:581.192  
**Carotenoid content of carrot varieties and strains.**  
 Food Res., Illinois 1945 : 10 : 84-97.

A detailed chromatographic and spectroscopic analysis was made of the carotenoid content of 16 commercial varieties, including 14 garden varieties and two Belgian stock varieties and 18 special strains; the roots were pulled at the age of 130 days and different parts of the root were analysed. The Belgian varieties were very low in total carotenes. The garden varieties averaged 54 microgram. of total carotenes per grm. of fresh carrot, and exhibited a narrow range of carotenoid content in contrast to the special strains which varied widely. The percentage of  $\alpha$ -carotene in the garden strains averaged 46%, thus constituting an important factor in the estimation of provitamin A.

460. KREMER, J. C. 635.15-1.531.12:581.162.3:578.08(73)

**Influence of honey bee habits on radish seed yield.**

Quart. Bull. Mich. Agric. Exp. Sta. 1945 : 27 : 413-20.

Various methods of securing improved seed yields by the agency of bees are discussed.

461. LIPŠIC, S. JU. 635.166:582

**(Contributary items towards a monograph of the genus *Scorzonera*).**

The All-Union Research Institute of Rubber and Guttapercha. Published by O.N.T.I.—The Central Editorial Office of Chemical Literature, Moscow 1935 : Pp. 164.

This work is the first part of what is intended to become a systematic monograph of the genus, and describes and discusses in detail the species of eight of the sections into which the genus has been divided. The material includes keys, as well as morphological and other data necessary for the identification of the species concerned, for several of which, moreover, anatomical descriptions and information about the rubber content are also given. Certain species likely to prove of interest to the plant breeders are pointed out; among them are a few having an ornamental value. The geographical distribution of the species is indicated. A large proportion of them are illustrated.

I. Z.

462. LIPŠIC, S. JU. 635.166:582

**(Contributary items towards a monograph of the genus *Scorzonera*. Part 2).**

The Moscow Society of Naturalists, Moscow 1939 : Pp. 168.

Continuing, in general, the same procedure as that adopted in the first part of this work, published in 1935, ten more sections of the genus are dealt with. It is mentioned that several of the species are edible, and are eaten baked like potatoes.

I. Z.

463. BELVAL, H. 635.24:575(44)

**L'amélioration du topinambour. (The improvement of the Jerusalem artichoke).**

Bull. Soc. Bot. Fr. 1944 : 91 : 108-11.

A short review is given of the progress made in developing the Jerusalem artichoke. The selection criteria mentioned include suitable shape and position of the tubers, photoperiodic adaptation, sugar content, and yield per hectare. Hybridization between this species and other *Helianthus* forms does not appear to have been of great service yet, but is nevertheless regarded as a promising method.

464. ŠAIN, S. 635.24:581.165:575.42(47)

**(The possibility of producing new varieties of Jerusalem artichoke by vegetative means).**

Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. U.S.S.R.) 1944 : Nos 11-12 : 39-41.

An experiment with the two varieties, Fjuzo and Belyi Kievskii, is described. Plants grown from the smallest, least developed, and phasically least mature eyes of tubers, produced more abundant foliage and formed larger tubers than plants grown from the largest eyes formed early in the season. It is believed that by selection among successive generations of plants grown from small eyes, varieties will be produced with the desired combination of characters.

465. EMSWELLER, S. L. and

JONES, H. A.

635.25:575.127.2:576.354.46

**Further studies on the chiasmata of the *Allium cepa* x *A. fistulosum* hybrid and its derivatives.**

Amer. J. Bot. 1945 : 32 : 370-79.

In *Allium Cepa*, the chiasmata of the bivalents in metaphase are all at random, whereas in *A. fistulosum* the chiasmata are located one on each side of the centromere, a local uniform configuration resulting. In the interspecific hybrids involving nine different varieties of *A. Cepa* and a single inbred line of *A. fistulosum*, the chiasmata were found to be at random as in *A. Cepa*. In an examination of plants of the first back-cross to *A. Cepa* no bivalents with localized chiasmata were observed; in spite of the high degree of regularity in their chromosome pairing these plants were in general highly self-sterile. Plants of the first back-cross to *A. fistulosum* could be

classified into two distinct groups, one with predominantly random and the other with predominantly localized chiasmata. A ratio of 1:1 of the two plant groups was observed, and is considered to be the result of elimination of most gametes not predominantly of the *A. fistulosum* or *A. Cepa* types. The first back-cross plants to *A. fistulosum* with local chiasmata showed a higher fertility than plants with random chiasmata, which is to be expected since such plants more closely approach the genotype of *A. fistulosum*. The second back-cross progeny to *A. fistulosum* could not, however, be grouped with two distinct classes. A discussion is given of these results with detailed reference to those of other workers.

466. IVANOFF, S. S. 635.25:575.22:581.02  
**Expression of certain hereditary factors in Yellow Bermuda onions induced by unseasonable planting in the greenhouse.**  
 Bot. Gaz. 1945 : 106 : 411-20.

A latent degree of morphological variation has been brought to light in the variety Yellow Bermuda by exposing it to high temperature, long photoperiods and high light intensity in a greenhouse. The variants were characterized principally by their bulbing behaviour.

467. BERGER, C. A. 635.25:576.356.5:581.04(73)  
**Experimental studies on the cytology of allium.**  
 Biol. Bull. Wood's Hole 1944 : 87 : p. 163. (Abst.).

The cytological effects of several chemical agents were studied on the root tips of *Allium Cepa*, and compared with the effect of colchicine. Acenaphthene, veratrine and other substances induced polyploidy, producing cytological effects similar to those of colchicine. Treatment with naphthalene-acetic acid affected the resting nuclei, and not dividing cells as in the case of the other chemical agents, and did not interfere with spindle formation and anaphase, two tetraploid cells being produced after division.

468. COWLEY, F. J. 635.26:575.42(72.91)  
**El cultivo del ajo. (The cultivation of garlic).**  
 Rev. Minist. Agric. Cuba 1944 : 27 : No. 28 : 25-27.

It is believed that the garlic variety commonly grown in Cuba could be improved by selection, and details are given of the selection criteria which growers should employ.

469. ANDERSEN, S. 635.5(48.9)  
 Om Slaegten Valerianella (Vaarsalat) i Danmark. [The genus *Valerianella* (spring salad) in Denmark].  
 Bot. Tidsskr. 1942 : 46 : 43-44.

The occurrence and use of various species are mentioned.

470. THOMPSON, R. C. 635.52:581.143.26:575(73)  
**Slobolt for home gardens.**  
 Sth. Seedsman 1945 : 8 : No. 8 : p. 11.

A description is given of the new lettuce variety Slobolt which withstands high temperature without bolting (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1179).

471. SINNOTT, E. W. 635.61/3:581.145.2:575  
**The relation of growth to size in cucurbit fruits.**  
 Amer. J. Bot. 1945 : 32 : 439-46.

The ovary and fruit were measured for volume during development in several inbred lines of *Cucurbita Pepo*, two lines of *Lagenaria vulgaris*, and a few fruits of plants obtained from commercial water-melon seed. Final fruit size showed little relation to growth rate but was determined chiefly by duration of growth. Heritable slight differences in growth rate were observed between the various lines. Little evidence of heterosis in fruit size was found, the *F*<sub>1</sub> fruits in most cases approximating to the geometric mean of the parent fruit sizes. No significant differences in rate of fruit growth were observed in a comparison made in three lines of the diploid and tetraploid forms.

472. WHITAKER, T. W. and PRYOR, D. E. 635.61/3-2.421.1-1.521.6(73)  
**The reaction of 21 species in the Cucurbitaceae to artificial infection with cantaloupe powdery mildew (*Erysiphe cichoracearum* DC.).**  
*Phytopathology* 1945 : 35 : 533-34.

The following species exhibited a high degree of resistance: *Citrullus vulgaris* Schrad., *Cucumis Anguria* L., *Cyclanthera explodens* Naud., *C. pedata* Schrad., *Ecballium elaterium* (L.) A. Rich, *Luffa acutangula* (L.) Roxb. and *L. aegyptiaca* Mill. The native species *Cucurbita foetidissima* H.B.K., *C. palmata* S. Wats., and *Echinocystis macrocarpa* Greene were susceptible. No species closely related to *Cucumis Melo* was observed possessing a higher degree of resistance than that found within *C. Melo*.

473. CULPEPPER, C. W. and MOON, H. H. 635.62:581.192  
**Differences in the composition of the fruits of *Cucurbita* varieties at different ages in relation to culinary use.**  
*J. Agric. Res.* 1945 : 71 : 111-36.

The chemical analysis of 36 varieties of pumpkin (*C. moschata* Poir.) and winter squash (*Cucurbita Pepo* L. and *C. maxima* Duch.) at different developmental stages and after different storage periods has been carried out. Variety and fruit age were found to be the most important factors affecting composition. There were comparatively small intervarietal differences in most constituents during the very early stages of the fruit development, but differences were often marked as maturity was approached. Among the varieties high in acid-hydrolysable polysaccharides at maturity and sugar during storage were Table Queen, Fordhook, Banana, Improved Hubbard, Golden Hubbard and Sibley. In both *C. Pepo* and *C. maxima*, some varieties possess high total dry matter and polysaccharide contents, and others low contents. *C. moschata*, however, contains no varieties with exceptionally high values for these two contents. Differences in flavour, consistency and appearance in numerous canning and cooking tests corresponded with differences in chemical composition.

474. Čižov, S. T. 635.63:575.125  
**(Yields of hybrid cucumbers in glasshouses).**  
 Moskovskaja ordena Lenina Seljskohozjaistvennja Akademija imeni K.A. Timirjazeva. Naučnaja Konferencija 3-10 ijunja 1944 g. Doklady. [Proc. Sci. Conf. Timirjazev Agric. Acad. (3-10 June, 1944)] 1945 : No. 1 : 42-43.

In 1940 twelve different varieties of cucumber were crossed with the forcing varieties Klinskii and Telegraf; seed was obtained from 34 different combinations. The technique used in hybridization is described.

Many of the hybrids clearly excelled the parents Klinskii and Telegraf in vigour. Some of them flowered earlier than the parents; the first to flower were Kulenkamp x Telegraf and Telegraf x Dalevostočnyi [Far Eastern], which flowered on 29 July; the next were Nerosimyi x Klinskii and Stepan Razin x Klinskii on 1 August. Increased yield was observed in 5 out of the 22 hybrids. The highest weight of fruit from 3 plants was 4565 grm. from Kulenkamp x Telegraf, as against 2700 grm. in Telegraf and 3210 grm. in Klinskii.

Twenty-one out of the 22 hybrids ripened their fruit earlier than the maternal forms.

475. COOPER, D. C. and BRINK, R. A. 635.64:576.356.5:575.12:581.141:581.8  
**Seed collapse following matings between diploid and tetraploid races of *Lycopersicon pimpinellifolium*.**  
*Genetics* 1945 : 30 : 376-401.

Reciprocal crosses were made between diploid and tetraploid strains of *L. pimpinellifolium*, originating from an inbred strain of the variety Red Currant, and between each of these strains and *L. peruvianum* ( $2n = 24$ ). The histological study of seed failure occurring in crosses between the common diploid form of *L. pimpinellifolium* and the tetraploid is similar to that observed in the interspecific cross, and is due to the development of a hyperplastic endothelium.

476. RICK, C. M. 635.64:581.162.5:576.354.4: 575.11  
**A survey of cytogenetic causes of unfruitfulness in the tomato.**  
 Genetics 1945 : 30 : 347-62.

The literature dealing with unfruitfulness in the tomato and its causes is reviewed. In 66 unfruitful plants found among approximately 55,000 field plants of the three canning varieties, Early Santa Clara, Pearson and San Marzano, of the district of the lower Sacramento Valley, California, unfruitfulness was largely due to gametic sterility which in all the plants investigated had a cytogenetic basis. Of the 66 unfruitful plants, 45 were triploid, 14 diploid, three tetraploid, two trisomic and two haploid. The frequency of all unfruitful types was similar in all three varieties, and the data obtained are regarded as typical of most tomato varieties and possibly of the species as a whole.

The 11 diploid plants fully investigated consisted of the following forms:—

- (1) Three plants were abnormal in gross morphology. It is suggested that sterility in this case is attributable either to the pleiotropic effect of the gene determining the morphological aberration or to the deficiency of a chromosomal segment which includes one gene producing abnormal morphology and another sterility.
- (2) Three plants exhibited a male sterility due to the presence of a single recessive gene; no viable pollen was produced. The development of the pollen mother cells and male gametophytes was different in all three plants. The value of such male sterility in the production of  $F_1$  hybrid seed is briefly discussed.
- (3) Five plants were normal in all respects except for the complete sterility of the pollen and ovules; the breakdown of the development of the male gametophytes was similar to that in the male sterile forms of group (2); the pollen mother cells of one plant exhibited an asynaptic meiosis similar to that described by other workers. Gene mutation is considered to be the probable cause of the sterility of these diploid types.

The tetraploid, triploid and haploid unfruitful forms were all characterized by a high proportion of both abortive pollen and embryo sacs. The tetraploid plants are the least unfruitful, the relatively higher fertility being due to their higher gametic fertility which in turn is conditioned by their more balanced chromosomal constitution. Polyembryony was not found to be a source of such polyploid and haploid plants. The one trisomic rooted successfully from cuttings was a dwarf plant occurring in the variety San Marzano and resembled the tetraploids of this variety; it was completely female sterile in spite of the normal appearance of approximately half of the embryo sacs, and it gave 19% aborted pollen grains.

477. CHANG, SHIEN TA 635.64:581.165.71(51)  
**(Experiments on the grafting of tomatoes).**  
 Fukien Agric. J. 1941 : 3 : 37-40; 1942 : 4 : 80-81.

Branches of the variety Earliana have been grafted successfully on *Capsicum annuum*, *Celosia* and the egg plant. Graftings on egg plants show higher resistance to wilt diseases, faster vegetative growth and earlier flowering than the seedling plants, but they bear small fruits and give a lower yield. T. C. Y.

478. BOHN, G. W. and 635.64:581.47:575.11.061.63(73)  
 SCOTT, D. H.  
**A second gene for uniform unripe fruit color in the tomato.**  
 J. Hered. 1945 : 36 : 169-72.

A second locus determining uniform unripe fruit colour and green-shouldered fruit has been located. The symbols  $U_1 u_1$  and  $U_2 u_2$  are suggested to designate respectively the locus previously described by other workers and this second locus. The  $F_2$  progenies of crosses between lines homozygous for  $u_1$  and lines homozygous for  $u_2$  indicate that the two gene pairs are borne on different chromosomes, the ratio of green-shouldered fruits to uniformly coloured being 9 : 7. Uniform colour is the result of homozygosity at either locus for the recessive allele.

A description is given of a forcing selection of Globe, called Uniform Globe, which differs in several characters from the commercial stock, has good quality, and is homozygous for  $u_2$  and  $y$ , the latter gene controlling colourless skin.

479. IRVING, G. W. (jun.),  
 FONTAINE, T. D. and  
 DOOLITTLE, S. P. 635.64-2.484-1.521.6:581.192  
**Lycopersicin, a fungistatic agent from the tomato plant.**  
 Science 1945 : 102 : 9-11.

Evidence is presented to demonstrate that the resistance to *Fusarium oxysporum* f. *Lycopersici* Synder et Hansen exhibited by Pan American and other tomato varieties is attributable to a fungistatic substance "lycopersicin".

480. HUA, H. N. 635.651:581.46:575.11.061.63  
**Genetical study of *Vicia Faba*. A preliminary report.**  
 Acta Brevia Sinensis 1943 : No. 4 : 18-20. (Mimeographed).

During the past seven years a considerable number of different forms of *Vicia Faba* have been collected in Honan and Szechuan. A summary is given of the results of genetical studies of these forms.

The flowers are grouped into three types, normal, white and black, according to the colour characteristics of the standard, wings and keel.  $F_1$  and  $F_2$  crosses between normal and white types, normal and black, and white and black, indicate the interaction of two dominant factors, designated *C* and *W*. When both are dominant, normal colour results. When *W* only is dominant, the black type of flower is developed. The remaining genotypes give white flowers.

When flowers with a dark violet standard were crossed with normal flowers possessing light violet or white standards, the dark violet colour was found to be dominant. A strain of the normal type with a narrow form of the pale violet or whitish wing margin behaved as a simple recessive to the normal type.

Crosses were made among the six different grades for black spotting on the wing which ranged from black to wings with no spotting at all. The deeper coloured grades appeared to be dominant over the lighter coloured in a simple Mendelian ratio.

The character of small wings behaved as a simple recessive to the normal condition. In crosses between the normal type of flower with flowers having wings and keel the same shape and colour as the standard, the  $F_1$  flower was intermediate; in the  $F_2$  the ratio of 1 : 2 : 1 was obtained. The characters of dwarf habit, yellow-green coloration of the plant, colourless hilum, and burnt sienna coloration of the seed coat, were found to be simple recessives to the normal height of three feet, normal green colour of plant, black hilum, and yellowish-green seed coat, respectively.

481. AMARGOS, J. L. 635.652:575.42(72.91)  
 Un nuevo tipo de frijol de carita. (A new type of *Carita* bean).  
 Rev. Minist. Agric. Cuba 1944 : 27 : No. 28 : 50-54.

A new variety of the *Carita* bean, type B, has been selected from the commonly grown form. It is characterized by setting its pods more or less simultaneously, instead of over a period of two months, and of producing its pods on long peduncles which project from the foliage and clear the ground.

482. LEANDRI, J. 635.652:581.143.7:576.312.34  
 Sur la mitose dans une plantule tricotyle de haricot. (The mitosis of a tricotyledonous bean seedling).  
 Bull. Soc. Bot. Fr. 1941 : 88 : 421-24.

The mitotic configuration of a tricotyledonous seedling of the variety *Soissons Blanc à Rames* was found to differ from the normal only in the slightly shorter length of the chromosomes.

483. HOWARD, F. L. and  
 ANDERSEN, E. M. 635.652-2.484-1.521.6(73)  
**Susceptibility of Logan and Florida Belle beans to *Fusarium* yellows.**  
 Phytopathology 1945 : 35 : p. 655. (Abst.).

The results of observations of the reaction of 11 varieties of snap beans to *Fusarium* yellows emphasized the importance of testing new varieties under local conditions before extensive plantings are made.

484. OCHOA, L. 635.652-2.8-1.521.6(72.91)  
Mosaico amarillo. Nota sobre las semillas de los frijoles en relación con esta enfermedad. (**Yellow mosaic. Note on bean seeds in relation to this disease.**)  
Rev. Minist. Agric. Cuba 1944 : 27 : No. 28 : 17-19.  
Experiments have shown that the bean varieties resistant to common mosaic introduced into Cuba from the U.S.A. are susceptible to yellow mosaic (*Phaseolus* virus 2). This virus is not transmitted through the seed.

485. LEFEBVRE, C. L. and 635.654-2.3-1.521.6(73)  
SHERWIN, H. S.  
**Observations on the bacterial canker of cowpea.**  
Phytopathology 1945 : 35 : p. 487. (Abst.).  
Varieties have shown differences in relative resistance to inoculations of *Xanthomonas vignicola*.

486. ABEEL, M. VAN DEN 635.655:575.42  
La sélection du soja. (**The selection of the soya bean.**)  
Bull. Agric. Congo Belge 1941 : 32 : p. 361.  
The most productive variety of soya bean in the Belgian Congo is O-Too-Tan, a variety with black seeds. The technique of hybridization is described; this is being used to increase earliness, to produce a productive white-seeded strain and to give the non-dehiscent character to the varieties likely to prove of interest. R. M. I.

487. PROBST, A. H. 635.655-1.543(73)  
635-1.557:578.08(73)  
**Influence of spacing on yield and other characters in soybeans.**  
J. Amer. Soc. Agron. 1945 : 37 : 549-54.  
The effect of different spacings upon yield, lodging, plant height, maturity and seed size have been obtained for the varieties, Mukden, Mandell, Dunfield and Illini, during the four-year period 1938-41. The varieties gave different yields with the different spacings, but in general the variability did not mask the ranking of the varieties which showed little change with any of the spacings. The least difference in yield, and usually the highest yield, was obtained when the plants were spaced two to three inches apart. In the present investigation the data for maturity and lodging did not give a true comparison when varieties spaced one inch apart were compared with varieties spaced considerably further apart. There was practically no difference in maturity between 2, 3, 4 and 5 inch spacings within a variety. Plant size and seed size were little affected by the different spacings.

488. LAMPRECHT, H. 635.656:575.116.1  
**The linkage group N-Z-Fa-Td of Pisum.**  
Hereditas, Lund 1945 : 31 : 347-82.  
The dentation of the leaf margin is determined by the gene pair *Td* *td* and possibly by an extra allelomorph at the same locus. Cross-over studies have shown that these genes are linked to other genes in the following order: *N-Z-Fa-Td*. The group *Cp*, *Gp*, *Bt*, *N<sub>1</sub>P<sub>1</sub>* and *Q* of Wellensiek does not appear to be well-founded; *Cp* and *Gp* alone appear to be linked, *N* belongs to the group mentioned above, while the existence of gene *Q* is doubtful. The large linkage group *D-P<sub>2</sub>-O-I-Re-Fa-Z-Uni-M-Mp-F-B-St-P<sub>1</sub>*, established by Winge, consists of three, viz. *D-P<sub>2</sub>-O-I-Re*, *Fa-Z* (*vide supra*), and *Uni-M-Mp-F-B-St-P<sub>1</sub>*. No confidence is felt in the subdivision of gene *Bt* into *Bta* and *Btb*, of gene *Cp* into *Cp<sub>1</sub>* and *Cp<sub>2</sub>*, or of gene *Pur* into *P<sub>1</sub>* and *P<sub>2</sub>*.

489. CASTAN, R. 635.656:581.14  
Diversité des réactions d'inhibition entre bourgeons parmi les variétés de pois. (**Differences in the inhibition reaction between buds in pea varieties.**)  
Bull. Soc. Bot. Fr. 1944 : 91 : 10-11.  
The varieties Express Alaska and Serpette differ in the mode of lateral bud development after the terminal bud is removed or damaged.

490. BONNEY, V. B. and FISCHBACH, H. 635.656:581.192:578.08  
**Comparative chemical studies on pea seed and canned soaked dry peas.**  
 J. Ass. Off. Agric. Chem., Wash. 1945 : 28 : 409-17.

An investigation was made to determine the possibility of chemical difference between the dry peas of the smooth skinned variety Alaska and sweet wrinkled varieties. Various data were also obtained on these varieties after soaking, blanching and canning. Alcohol-insoluble solids and the ratio of crude starch to protein were much higher in the variety Alaska, whether dry or canned, than in any of the thirteen sweet wrinkled varieties tested. The pectic acid content of the drained canned peas was not found to be sufficiently different among the varieties to provide a valuable basis for varietal evaluation.

491. CYRUS, W. F. 635.656.00.14(75)  
**Dixie Wonder pea.**  
 Sth. Seedsman 1945 : 8 : No. 7 : 11, 40.

Extensive trials in Georgia, Mississippi, Alabama and Louisiana, of Dixie Wonder, a strain selected from the standard Austrian pea, have indicated that this new variety can be ploughed under three to four weeks earlier than the standard variety.

492. CLAUSEN, R. T. 635.659:582  
**A botanical study of the yam beans (*Pachyrhizus*).**  
 Mem. Cornell Agric. Exp. Sta. 1944 : No. 264 : Pp. 38.

A detailed description is presented of the six known species of *Pachyrhizus* and their varieties; three species are defined for the first time, viz., *P. panamensis*, *P. strigosus*, *P. vernalis*. *P. erosus*, *P. tuberosus* and *P. Ahipa* are of economic importance on account of their edible tubers. The resinous seeds of the various species have insecticidal and medicinal properties which may be economically valuable.

493. VALLE, C. G. DEL 635.67:575(72.91)  
**El maiz dulce. (Sweet corn).**  
 Bol. Estac. Exp. Agron., Santiago 1945 : No. 62 : Pp. 18.

Although corn in the cob is popular in Cuba, varieties of true sweet corn have only recently been introduced. The varieties from North America are photoperiodically ill adapted to Cuban conditions. By crossing sweet varieties from the U.S.A. with a Cuban field variety Habana PF (MS)<sub>4</sub> it has been possible to produce two sweet varieties, Gondeva and Pajimaca, which grow well in Cuba and also in Costa Rica, El Salvador, Peru and Hawaii. The sweet varieties resemble the original Habana in all respects other than the grain characters. Three back-crosses with Habana were necessary to attain this resemblance when a variety from the north of the U.S.A. was used, but only two when using one from the southern states.

The characteristics of the two new varieties are described.

## BOOK REVIEWS

LOEB, L.

57:581.162.52:575.125

**The biological basis of individuality.**

Charles C. Thomas, Springfield, Illinois 1945 : \$10.50 : Pp. xiii + 711. tables.

The syncretic tendency of genetics has been frequently remarked in the past ten years. Very early in its development, cytology was appropriated, then the evolutionary theories derived from Darwin, and to-day it appears that the sciences of virus and cancer research are heading for a similar merger.

In consequence, the task of breasting the relevant literature is becoming increasingly difficult for geneticists, and the labour of correlating the parallel, or rather convergent, developments that bear upon genetical problems is becoming very heavy. Professor Loeb, in an exhaustive monograph of over seven hundred pages, has attempted the arduous task of bringing together the facts relating to one aspect of genetical theory, the biological basis of taxonomic differentiation, both on the narrow scale, as between individuals of a species, and also on the broad scale, as between different species. Most of the evidence quoted is zoological and deals with experiments on tissue transplantation, tumour transplantation and serology. The collation of such material, which will be unfamiliar to many geneticists, especially plant geneticists, is very welcome, especially as the conclusions derived are of general biological interest.

The term "individuality" is used by the author, not in the primary sense of the property of discrete existence, but in the secondary sense of the property of peculiarity. The underlying causes of the minute differences between the members of a species and the larger differences between species themselves are treated in considerable detail. Individuality so defined is classified under three subordinate categories, essential, mosaic and psychical individuality. The first, essential individuality, is regarded as the type of specificity deriving from the fact that all, or at least most, parts of an organism have certain unique characteristics in common. Mosaic individuality on the other hand is the type of specificity deriving from a particular coincidence of the various tissues which are arranged after a slightly different pattern in each individual. Psychical individuality, or personality, is a characteristic only of self-conscious beings, perhaps only of mankind, and is characterized by the assumption, held by the individual, that, beneath the succession of psychic states, there is a unique and enduring "self".

The principal thesis of Professor Loeb's discussion is the theory that essential individuality in all organisms is the resultant of the presence in all, or almost all parts of the organism, of a definite chemical substance or complex of substances, the individuality differential. Analogous differentials are believed to characterize species and the higher taxonomic categories, also the component organs and tissues of each individual. These differentials are regarded not as genes, but as products derived from the activity of genes, and it is thought probable that they are proteins or conjugated proteins, perhaps associated with simpler compounds.

Much space is devoted to an analysis of the distinguishing traits of these differentials. It is necessary that they should be distinctive of the organism bearing them, that they should be present throughout the extent of the organisms, that they should act as indicators of taxonomic relationship, and that their constitution should be determined not by one or a few genes, but by the interaction of the greater part of the whole gene complex. This latter prerequisite rules out the possibility that the blood group proteins are individuality differentials, although it is possible that these substances may form a component of a chemical complex acting as a differential. In this connexion also, it is important to note that the author allows the possibility that a single gene mutation may not cause an alteration in the constitution of the individuality differential.

The origin of individuality and other differentials is explained along evolutionary lines. It is thought that there has been an evolutionary trend in the direction of increased differentiation of the individuality differentials and that this differentiation has become much finer in animals than in plants, or at least much more evident. Moreover, a comparable development is believed to accompany individual ontogeny, for the reactions used to investigate individuality differentials become more pronounced as the adult condition is approached.

Special consideration is given to the connexion between these ideas and the theory of fertilization in plants. Sexual fusion is regarded as analogous in some ways to transplantation, showing however, in many instances, a tendency towards homiofertilization, that is, conjugation between

similar but genetically distinct individuals. The causes of self-sterility are analysed briefly, also the phenomena of heterosis and the depression often accompanying inbreeding. With regard to hybrid vigour, the author considers two suggestions, firstly the genetical explanation of complementary growth factors, and secondly a physiological explanation based on the Arndt-Schultz effect in which minute doses of a toxin (in this case the homotoxins derived from genetically different conjugants) act as stimulatory agents.

It is extremely difficult to assess the full cogency of the author's views, so voluminous is the evidence presented and so complex the problem of evaluating its significance. Most geneticists would be prepared to grant that the nuclear constitutions of most cells of an individual are chemically similar, but there still seems to be insufficient evidence for admitting the presence throughout the individual of characteristic individuality differentials, even though various common potentialities of behaviour in response to various treatments may be demonstrable. Also, the suggestion that differentials exist characterizing species and higher groupings seems to make insufficient allowances for the possibilities of parallel and convergent biochemical evolution. The last section of the book, that dealing with psychical individuality, is only remotely connected with the earlier part. Psychical individuality is believed to have evolved along with the nervous sensory and hormone systems, and parallel with the biological types of individuality already treated. It is contended that psychical individuality is really a mosaic of psychical states, the permanence of mind and the reality of free will being regarded as illusory hypotheses developed through inadequate analysis of the mechanism of psychical behaviour. Being unable to concede the existence of an enduring substrate beneath the flux of psychical states, the conclusion is drawn that individuality reaches its highest expression in the biological essential individuality dependent on the presence of individuality differentials. Such conclusions are of course widely accepted to-day but they need for their elucidation a far more searching psychological and philosophical analysis than the limits of this book have allowed. Nevertheless, Professor Loeb's attempt to integrate so vast a body of facts and to throw light on so important a biological problem will earn the appreciation of biologists generally, and will stimulate further research into one of the most fundamental problems of biological science.

RUSSELL, E. S.

57.1

**The directiveness of organic activities.**

Cambridge University Press 1944 : 8s. 6d. Pp. viii + 196. 23 figs.

One of the most interesting patterns in the history of biology is the alternation of mechanistic and anti-mechanistic periods of theoretical speculation. Mechanistic theories tend to become ascendant when some of the properties of a biological system are explained in terms of the interaction of subordinate elements. The assumption is then made by extrapolation that all the properties of the system considered will ultimately be so explicable, the complexity of the system alone preventing a conclusive demonstration.

Following on this period of mechanistic optimism, it is common to find an era of uncertainty, when the inadequacy of the mechanistic explanation becomes gradually obvious. Anti-mechanistic theories are then proposed in lieu of the discredited mechanistic explanations, and these usually persist until a new discovery of the kind first mentioned heralds in a fresh batch of mechanistic hypotheses, and the cycle begins over again.

In the nineteenth century, the amenability of physiology to chemical and physical analysis and the success of the theory of Natural Selection in explaining organic evolution, led to a period of biological materialism which persisted until the turn of the century, when Driesch initiated his system of neo-vitalism, based largely on the data of experimental embryology. Following after this, the two sciences of genetics and biochemistry came into prominence, the former based on a synthesis of Mendelism and Darwinian ideas, and the latter applying with increasing surety, the methods of organic chemistry to living processes. A mechanistic outlook was the natural accompaniment, and it is only quite recently that its antithesis, the organic philosophy of Whitehead, has appeared. This system, although very ancient in its origins has only become important in biology in the last few years, where it has been developed by such biologists as Woodger, Needham and Agar.

Dr Russell's book is symptomatic of this recent change in attitude, and although he makes little reference to the philosophy of organism, he takes great pains to point out the deficiencies of pure mechanism.

The burden of this exposition is the demonstration of the real existence of biological activities directed, albeit unconsciously, towards various goals, the latter being themselves orientated towards the preservation of the cyclic process of life under its threefold aspect of self-maintenance, development and reproduction. Numerous examples are given of the various means by which these three biological ends are served, cases being classified either as behavioural, physiological or morphoplastic, though it is recognized that no sharp distinction can be drawn between these modes of activity. Throughout this work, the author is scrupulous in avoiding any suggestion of purposeful behaviour in the illustrations quoted, yet it is confidently affirmed that "no mechanistic explanation can account for the orderliness and directiveness of organic activities, their harmony and co-operation towards biological ends, which is so strikingly shown in the development of the organism".

In his final chapter, Dr Russell summarizes his whole position by quoting Spinoza's dictum that striving towards self-maintenance is the essence of existent beings:

*Conatus, quo unaqueque res in suo esse perseverare conatur, nihil est praeter ipsius rei actualem essentiam.*

It is surprising to notice, however, that, whereas Spinoza regarded conation as characteristic of all entities, Dr Russell regards it as the prime distinction between living and non-living things. He deprecates the Cartesian dichotomy of mind and matter, asserting that psychological behaviour is but a mode of vital activity, yet he uses the well-chosen examples of the earlier part of his book in an attempt to draw a distinction of kind between vital and non-vital processes. In the positive arguments of his book for the real existence of directional behaviour, Dr Russell presents a case of great cogency, and goes far to demonstrate that discarding teleological notions does in fact eliminate an essential element in the understanding of vital processes. But, on the other hand, it is difficult to avoid the feeling that a sufficient distinction has not always been drawn between efficient and final causation, and that, at times, realization of the complementary nature of these two modes has been prejudiced by anti-mechanistic notions. The question of the relation of biology to psychology is treated unsatisfactorily, since the problem of cognition is not even mentioned. And in his attempt to demonstrate the importance of directional activity, the author appears to have proceeded to the extreme of denying its existence in the inorganic world, thereby creating a difference in kind of dubious validity between living and non-living things. Nevertheless, in providing a corrective to the anti-teleological ideas current in recent years, Dr Russell's exposition should serve a useful purpose, and should contribute to building up a satisfactory philosophy of biology in which the relations of efficient and final causation are adequately elucidated.

RODGERS, A. D. III

58(73)

**American Botany 1873-1892. Decades of transition.**

Oxford University Press, London 1944 : 25s. Pp. 340. illus.

Readers of Mr Rodgers' previous studies in the history of American botany will know what to expect in this latest volume. The same wealth of biographical details of the systematists and abundant quotations from their letters lead in this, as in the earlier books, to the gradual emergence of mental portraits of the individuals concerned.

But is this the history of botany? Too much attention seems to be paid to relatively trivial matters. Admittedly some of them are amusing, such as Parry's account of the impossible behaviour of one Marcus Jones, or even fantastic, like the Miss Fanny Fish on p. 207, but too much is dull and repetitive. On the other hand, there is a notable deficiency of material which would justify the book's sub-title. Whenever the author leaves the minutiae of systematic botany he appears ill at ease. The reader may be thirsting to know what American botanists who had to tackle problems related to horticulture and agriculture were thinking, especially about physiology, inheritance and pathology. The author, however, after briefly indicating that there might be some interesting material originating in the 1880's in America, turns back with an almost audible sigh of relief to the systematists and their squabbles.

The defects of style previously noted (cf. *Plant Breeding Abstracts*, Vol. XV, p. 374) are again present and make this a very difficult book to read, but the amount of information collected and presented make it a book which cannot be ignored by any student of botanical history.

J. L. F.

VERDOORN, F. (Editor)

**Plants and plant science in Latin America.**

Waltham, Mass., the Chronica Botanica Co; London, W. 1, Wm. Dawson and Sons, Ltd. 1945 : \$6.00. Pp. xxxvii + 381. 38 plates. 45 illus.

Book production, since the time when the natural sciences became differentiated from philosophy, has remained one of the happiest meeting grounds of science and the arts. Biological texts in particular have a place in the history of art which, if as yet unwritten, is none the less significant. It is proper, therefore, when considering the merits of a new production to judge from a *hylo-morphic* standpoint, discussing firstly the matter of the book, the scientific data and their implications, and secondly its form, the mode in which these are presented.

*Plants and Plant Science in Latin America*, as regards its matter, is an extremely useful collation of material relating to the botany and agriculture of the West Indies, Central and South America. In addition to providing information on the botanical history, palaeontology, plant geography, floristics, ethnobotany, crop plants—special attention being paid to rubber—and forestry of these regions, an account is given of such topics as nutrition, plant pathology, climatology, geology, pedology and soil conservation. Most of the countries in the region considered are treated separately, including the islands of the Galapagos, Falkland and Juan Fernandez groups, San Ambrosio and San Felix, though Barbados, the Bahamas and Tierra del Fuego are only mentioned incidentally. A useful bibliography is provided of the travel books of botanical interest, also information on the botanical and agricultural institutions, societies and journals of Latin America. Numerous maps and a fine set of illustrations reproduced from the botanical classics of the continent add to the interest of the work, and a valuable list, compiled by Lanjouw, is given of the locations of the herbaria collected by visiting botanists. Of particular interest to plant breeders are two articles, one by Krug on plant breeding, genetics and cytology in Latin America, and the other by Rands on rubber breeding.

It would be no exaggeration to say that few books contain so comprehensive a survey of Latin American botany, and it is therefore with much regret that it is felt necessary to criticize the book on its form and arrangement. The Chronica Botanica Company has done so much towards setting a high standard in the aesthetic side of book production that it is surprising to find a book of such general utility taking the form of a series of short articles, each by different authors, written in one of four languages, English, Spanish, French or Portuguese, the whole lacking uniformity in the mode of treatment of the various topics. Instead of adopting a serial order, the book is divided into two parts, the first consisting of original articles and the second of revised reprints of papers already published in *Chronica Botanica*; in each section, the articles are arranged according to country, proceeding from north to south, with an unclassified series of general articles at the end of each, and a few introductory papers prefixed. There is no subject index but an amplified table of contents.

The valuable services that the Chronica Botanica Company has rendered to the art of botanical text publication are too well known to need reiteration. It is to be hoped that they will continue to publish material of such general botanical interest as the volume under review, but will cast it in future into a form more consonant with the high standard set in their other publications.

LAZAREV, P. P.

581.03

(Modern problems of biophysics).

The Academy of Sciences of the U.S.S.R., Moscow-Leningrad 1945 : Pp. 152.

63 figs. 4 tables. illus.

This fascinating small book was written with the object of analysing stage by stage the basic properties of living matter as related to modern advances in the realm of physics and physical chemistry. This branch of biology was given the name of "medical physics" by Fick, and it was the French worker, d'Arsanval, who coined the new name—"biological physics (biophysics)"—for it. This branch of science, having acquired the outward aspect of physico-mathematical terminology and technique, makes use, in the field of biology, of physical theories and mathematical analysis to the same extent as they are employed in interpreting the phenomena of non-living matter. Russian scientists made great contributions to biophysics both before and after the Revolution. The historical account is given in the volume *Biophysics* published in 1940 by the Moscow Society of Natural Science. At the present time there are in the U.S.S.R. numerous laboratories in which research in various branches of biophysics is conducted by many workers.

The book is divided into five parts comprising 22 chapters. In the first part the author deals with the general properties of living organisms and the laws governing the process of life. Modern thermodynamics and kinetics of life phenomena are discussed in Part II. Growth, cellular fission and concomitant processes, fertilization and parthenogenesis are surveyed in Part III. The phenomena of excitation in tissues and organs are reviewed in Part IV; and Part V is devoted to the methods of modern physics as applied to the solution of biological and medical problems.

H. F.

ABRAMS, L.

581.9(37)

**Illustrated flora of the Pacific States Washington, Oregon and California. Vol. II. Polygonaceae to Krameriae (Buckwheats to Kramerias).**

Stanford University Press, California and Oxford University Press, London 1944 : \$7.50. Pp. viii + 635. illus. 1300-2962.

There can be few botanists who would deny that one of the prime prerequisites for botanical research in any country is a good local flora. Yet it is also undeniable that few countries or regions can boast a flora that combines reliability with utility, presenting the essence of the taxonomic research relating to the region covered, and at the same time providing a ready means of identifying any plant that occurs there. And in this last connexion, the desideratum is clearly that each species should be figured as well as described.

Professor Abrams, whose second volume of the *Illustrated Flora of the Pacific States* is here under review, can justify claim to have established a standard in flora production that could be followed with advantage by most other compilers of local floras. Not only is the text lucid and pleasant to read, conveying the essential taxonomic criteria of each species, together with data on their ecology and distribution, but it is supplied with usable keys and accompanied by a fine series of illustrations, one for each species, arranged to best advantage by separating the figures from the text and adopting a uniform style of representation in which nine species are figured per page. The families treated are those included in the Englerian orders Polygonales, Centrospermae, Ranales, Rhosidae, and Rosales, together with the two families of insectivores, Sarraceniaceae and Droseraceae. *Parnassia* and *Krameria* are removed from the families in which they had formerly been placed, notwithstanding their doubtful affinities, and are placed much more logically in the monotypic families Parnassiaceae and Krameriae. The reader will also be grateful to discover that the author has lumped many of the species in the genera *Rosa* and *Rubus*. One possible way in which the flora as a whole could be improved is by the addition of brief indications of the affinities of the various species described, many of which are probably members of more comprehensive coenospecies. But it might well be argued that the time is not yet ripe for such measures, the necessary cytological and genetical information being inadequate.

In cordially recommending this volume to the botanically interested public, it need only be added that it exerts the fascination of only the finest botanical texts, and invites perusal of its pages as a pleasure in itself.

633.15:581.9

HUMLUM, J.

633.15:581.056:631.557

Zur Geographie des Maisbaus. Ursprung, Verbreitung, heutige Ausdehnung des Maisbaus und seine Bedeutung für den Welthandel. Anforderungen des Maises an das Klima, mit besonderem Hinblick auf Rumänien. (On the geography of maize cultivation. Origin, distribution and present-day extension of maize cultivation and its importance for world trade. Climatic requirements of maize, with particular reference to Rumania).

Einar Harcks Forlag, København 1942 : Pp. 317. 57 tables. 140 plates.

An extensive study is made of available statistics on maize cultivation and world trade in maize, and detailed distribution maps relating to all important maize-growing countries are given. This is followed by a study of the relations of the maize crop to its climatic environment, and in the case of Rumania correlation studies are made between maize yield and monthly rainfall, mean temperature and number of hours of sunshine. Such points as the effect on maize yield of inter-cropping with cucurbits, beans or other crops, and the relation between maize yield and the yield of other crops are discussed.

Preliminary chapters include an account of early historical references to the maize crop, current scientific evidence of the origin of the crop and a brief description of its diseases and pests. S. E.

WHALLEY, M. E.

633.491:016

**Abstracts on potato research.**

National Research Council of Canada, Ottawa 1944 : No. 1013 : \$1.00. Pp. 122. (Mimeographed).

Prepared in 1941 for local purposes and now released for general distribution, this annotated collection of recent papers contains 295 references dealing with a wide range of subjects connected with the production of the potato for various human and livestock requirements. The papers cited deal chiefly with the chemical, biochemical, and industrial aspects of potato production, including, for example, the use of fertilizers, insecticides and fungicides, storage problems, and the biochemical changes in the tuber caused by virus attack, the chemical content of tubers, and the utilization of potato products in distillation. The references together with the abstracts are arranged alphabetically according to the authors, and a subject index is provided. Certain important subjects, such as virus resistance, are included but receive only slight attention numerically. Relevant European, Russian and Japanese literature is represented, but the main bulk of references are from North American sources. Within its limits the compilation is a useful, clearly arranged source of reference.

LEGGETT, W. F.

633.52:9

**The story of linen.**

Chemical Publishing Co., Inc. New York 1945 : Pp. xi + 103.

Facts concerning the history of linen production have been collected from a wide range of sources and conveniently compiled in a useful, simply written volume. Notes are appended on the history of three other important natural fibres, ramie, hemp and sisal. Chapters are devoted to the ancient methods of spinning and weaving, and the use of linen in the Stone Age, by the Phoenician traders, the Egyptians, Hebrews, Greeks and Romans, and in the various northern European countries and in colonial America. An interesting picture is given of the rich and intricate part linen has played in the wealth and daily life of the different countries and civilizations. Of the four chief textiles, linen is shown to be the most ancient, relics having been found which reveal the use of flax in spinning and weaving by Neolithic men. It is perhaps salutary to be reminded in our age of intense scientific and mechanical advancement that the ancient Egyptians often wove fabrics with as many as 540 warp threads to the inch, with only hand implements, thus producing a fineness never equalled or surpassed by the machine.

A bibliography of 22 books is included, on various aspects of textile production in the ancient and modern worlds; further details beyond merely the authors and titles would have rendered the bibliography a more convenient source of reference.

FRISAK, A.

635-1.531.12(48.1)

Frøavl av grønnsaker og rotvekster. (**The raising of seed of green vegetables and root crops.**)

Grøndahl and Søns Forlag, Oslo 1943 (1945) : Pp. 252. 145 figs. 4 plates.

Originally based on the *Laerebok i Frøavl* (Textbook on Seed Production) compiled in 1923 by the present author in collaboration with the late G. Gulli and awarded a prize in 1923 by the Fuhr's Foundation for the Promotion of Horticultural Seed Production in Norway, the material for Frisak's manual has been recently enlarged as a result of his study tours in Norway to investigate seed production. The 1923 plan of the book has been retained with additions in the details and a chapter on plant breeding.

The book, which is illustrated, is divided into three parts:—

Part I deals in detail with seed production in Norway; climate, soil and manuring; sowing, harvesting and winter storage; planting and care of plants for seed; diseases and pests; danger of cross-pollination; harvesting, threshing, drying, etc.; organization of production and trade in seed; and seed control and seed storage.

Part II treats of the aims and methods of plant breeding with special sections on self and cross-pollinating forms, plant isolation, hybridization, heterosis, mutation and the raising of the pure strains obtained by breeding.

Part III contains detailed notes with useful photographs on 33 annual, biennial and perennial crop plants.

An alphabetical index and a bibliography of works used in writing the book complete this essentially practical and highly useful manual. The bibliography is of special interest as a survey of Norwegian, Danish and Swedish literature on seed production, a branch of plant improvement in which the Scandinavian countries excel.

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